STANDARDS DEVELOPMENT BRANCH OMOE
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INDUSTRIAL WASTES SURVEY

polymer corporation limited

may–september 1972

TD
897.5
.R47
1972
MOE

Ministry
of the
Environment
Ontario

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A
Report On
An Industrial Wastes Survey
of
POLYMER CORPORATION LIMITED
Sarnia, Ontario

May - September, 1972

INDUSTRIAL WASTES BRANCH
MINISTRY OF THE ENVIRONMENT

TD
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INTRODUCTION

During the period from May to September, 1972 an extensive industrial wastes survey was conducted at Polymer Corporation Limited by field staff of the Ministry of the Environment. The purposes of this survey were:

1. to provide up-to-date technical information on the processes currently in operation at the Polymer complex
2. to assess the current waste loadings discharged to the St. Clair River
3. to evaluate the industrial wastes treatment systems installed at the various units
4. to identify areas where further improvement and/or additional treatment is required

The Polymer complex consists of several units, each involved with the manufacture of various polymers and latices or the monomers from which they are produced. The complex also includes a steam and power plant to provide the necessary steam and electrical power for use in the manufacturing units. Within the text of this survey report each of these units will be described and discussed individually. The overall implications of the waste discharges to the St. Clair River from each unit will be discussed in the separate section entitled "Outfalls".

SUMMARY

This industrial wastes survey report provides an up-to-date compilation of information on the production processes and the waste treatment systems currently in operation at the Polymer complex.

The results obtained on samples collected during this survey reveal a number of areas where improvement of the quality of the wastes discharged to the St. Clair River is required. The following general recommendations are made in this report:

1. Polymer Corporation Limited should take the necessary steps to remove or substantially reduce the dissolved organics contained in the wastewater effluents of the Wemco, the Graver, and the main oil separator in order to reduce the potential for fish tainting, other sub-lethal effects, and the odour of the effluents.
2. A program should be recommenced to reduce the amount of phenolic compounds being discharged from the complex. This program should be directed towards reducing the phenol loadings discharged from the stripper bottoms in the Styrene Unit, from the finishing area in the Copolymer Unit, from the phenol removal system in the Butadiene Unit and from the Stereo oily water separator.

3. The ether extractable loadings in the streams discharged from the Wemco and the main oil separator should be further reduced. A program to accomplish this may be an integral part of a program to reduce the fish tainting and odour producing qualities of the effluents.

4. A policy should be adopted whereby the amount of dissolved solids discharged from the Copolymer finishing building is kept to a minimum.

5. An investigation should be initiated to determine whether the sodium hexa meta phosphate used to treat boiler feed water in the Steam and Power Plant can either be replaced with a phosphorous-free chemical or reduced by other in-plant improvements or treatment methods.

6. The pH of the effluent stream from the stave tank at the Feed Preparation unit should be maintained within the Ministry objectives at all times.

7. Polymer Corporation Limited should submit to this Ministry a complete and effective waste treatment program accompanied with a complimentary schedule directed towards implementing the recommendations made in this report.

CONDUCT OF THE SURVEY

At the outset of the survey for each unit a meeting was held between Ministry and Polymer technical personnel to discuss the manufacturing processes involved, the wastes generated by these processes, the waste treatment systems currently employed and the problems associated with each. After the conclusion of each meeting the facility in question was toured in order to visually examine the manufacturing unit and the wastes discharged and to identify the sample points for the subsequent sampling program.

During these discussions, the following personnel were involved.

Polymer Corporation Limited

I.W.E. Harris - Coordinator-Waste Management
H. Minnis - Pollution Analyst
K. Shilson - Stereo Unit
T.G. Scurfield - Stereo Unit
G.K. Watson - Styrene Unit
R.F. Coulter - Copolymer Unit
J.S. Nettleton - Butyl Unit
R.P. Moran - Latex Unit
L. Fraczyk - Butadiene Unit
M. McGrath - Butadiene Unit
R.G. Drummond - Feed Preparation Unit

W.N. Brown - Steam and Power Plant
T.C. Smith - Operations Services

Ministry of the Environment

R.A. Breeze - Chemical Technologist
P. Litrenta - Student
J.D. Luyt - District Engineer

Sampling Details

During the survey, samples were taken within the individual units, at the battery limits of each unit, and at the outfalls of the various sewers discharging to the St. Clair River. In general, five-hour composite samples were collected at the battery limits of each of the units and at the outfalls to the River for three consecutive days. Five-hour composite samples were taken at each in-plant sample point for two consecutive days and grab samples at various points were taken when thought to be of value. In all cases the aliquots for the composite samples were taken hourly.

At each sample point, four 32 oz. bottles were taken and identified for a particular single analysis or series of analyses. In specific cases, fifth and, at times, sixth samples were collected for tests such as threshold odour and gas chromatographic analysis.

It was decided that a coding system should be adopted to identify the large number of samples collected during this survey. An example and explanation of this system is as follows.

e.g: Typical Sample Code

16/6 - 5D - III - 5C

where

16/6 = date (June 16, 1972)

5 = sample point

D = unit

III = analysis or analyses requested

5C = type of sample

Sample Points

- numbers will be identified in the description of each unit.

Unit

A - Stereo

B - Styrene

C - Copolymer

D - Butadiene

E - Outfalls

F - Feed Preparation

G - Dump Site

Identification of Analysis Requested

I,II - Standard tests (Solids, BOD, COD, TOC, pH and other tests as requested)

III - Ether Extractables

IV - Phenols (preserved with $CuSO_4$, teflon caps)

V - TON (sample bottle filled to eliminate air space)

VI - Gas chromotographic analysis (one-gallon sample)

Type of Sample

G - Grab

5C - 5 hour composite

3C - 3 hour composite

Water Use and Distribution

The following table shows the distribution of water in the Polymer plant.

Stereo Unit	-	6.2 mgd
Styrene Unit	-	14.1 mgd
Copolymer Unit	-	22.0 mgd
Latex Unit	-	6.5 mgd
Butyl Unit	-	18.5 mgd
Butadiene Unit	-	33.1 mgd
Feed Preparation Unit	-	16.2 mgd
Steam and Power Plant	-	25.0 mgd
TOTAL		141.6 mgd

STEREO UNIT

The Stereo Unit produces an assortment of polybutadiene and trans-polyisoprene polymers using a continuous solution polymerization process. These polymers are currently produced at the rate of 50,000,000 and 400,000 pounds per year respectively. Since October, 1967, the facility has also been experimentally producing a brominated form of butyl rubber. At the time of the survey this polymer accounted for 6,000,000 pounds per year of the total unit production.

A. PROCESS

I. Polybutadiene

(a) Raw Materials

butadiene
benzene
butene
diethyl aluminum chloride
cobalt octate
methanol
butylated hydroxy toluene
triphenyl phosphite
ethyl bis 2 butyl meta cresol
extender oils
sodium hydroxide
organic acid

(b) Process Description (Diagram # 1)

Butadiene, received from the petrochemicals area of the Polymer plant, is initially water washed to remove undesirable compounds such as carbonyls that may adversely affect the polymerization process. This washed butadiene stream is continuously mixed with the reaction media, a benzene/butene mixture. The total mixture of butadiene/benzene/butene is then distilled to remove water before it enters the reactors. A carefully controlled catalyst stream of diethyl aluminum chloride and cobalt octate is also metered into the reactors. The resulting reaction continues as it passes through the temperature controlled reactor system and exits with approximately 70 percent of the monomer converted to the polymeric form. The resulting solubilized mixture of rubber in solvent, formed during the reaction, is stopped with methanol and protected from oxidation in the drying and customers manufacturing processes by the addition of an antioxidant.

Coagulation, the next step, involves the addition of steam and water to the solubilized rubber to flash off the solvent and unreacted monomer. The resultant rubber crumb in water slurry proceeds to the finishing building where it is dewatered, dried and baled.

The solvent recovery system is an integral part of the unit. The solvent driven off at the coagulation step is condensed, water washed and distilled before recycling.

II Polyisoprene

(a) Raw Materials

isoprene
benzene
alkyl aluminum compound
organo metallic compound
heavy metal salt
methanol
ethyl bis 2 butyl meta cresol
butylated hydroxy toluene
organic acid
ethylene diamine tetra acetic acid
trisodium phosphate
zinc chloride
potassium stearate

(b) Process Description (Diagram #2)

Isoprene, received from an outside source is continuously mixed with a benzene solvent which acts as the polymerization medium. The combined flow is dried to remove any traces of water and the catalysts added before the flow enters the reactors. After the desired conversion has been attained, the reaction is stopped by the addition of methanol and the rubber protected from degradation by adding an antioxidant. Organic acid is also added to extract catalyst residues from the polymer and thereby ensure a light coloured product. The cement is then centrifuged to remove a portion of the water and catalyst.

DIAGRAM NO. 1 POLYBUTADIENE PROCESS

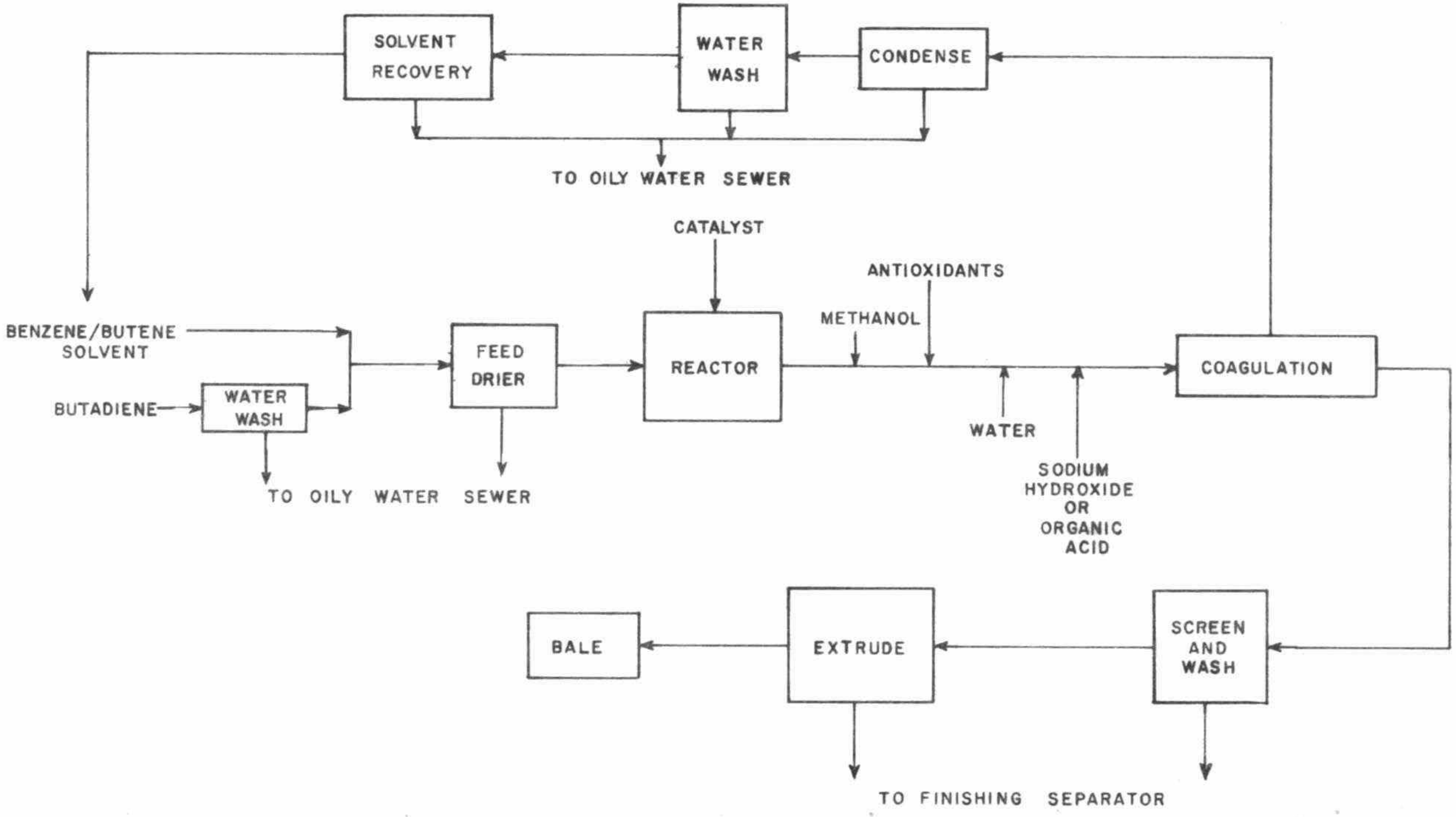
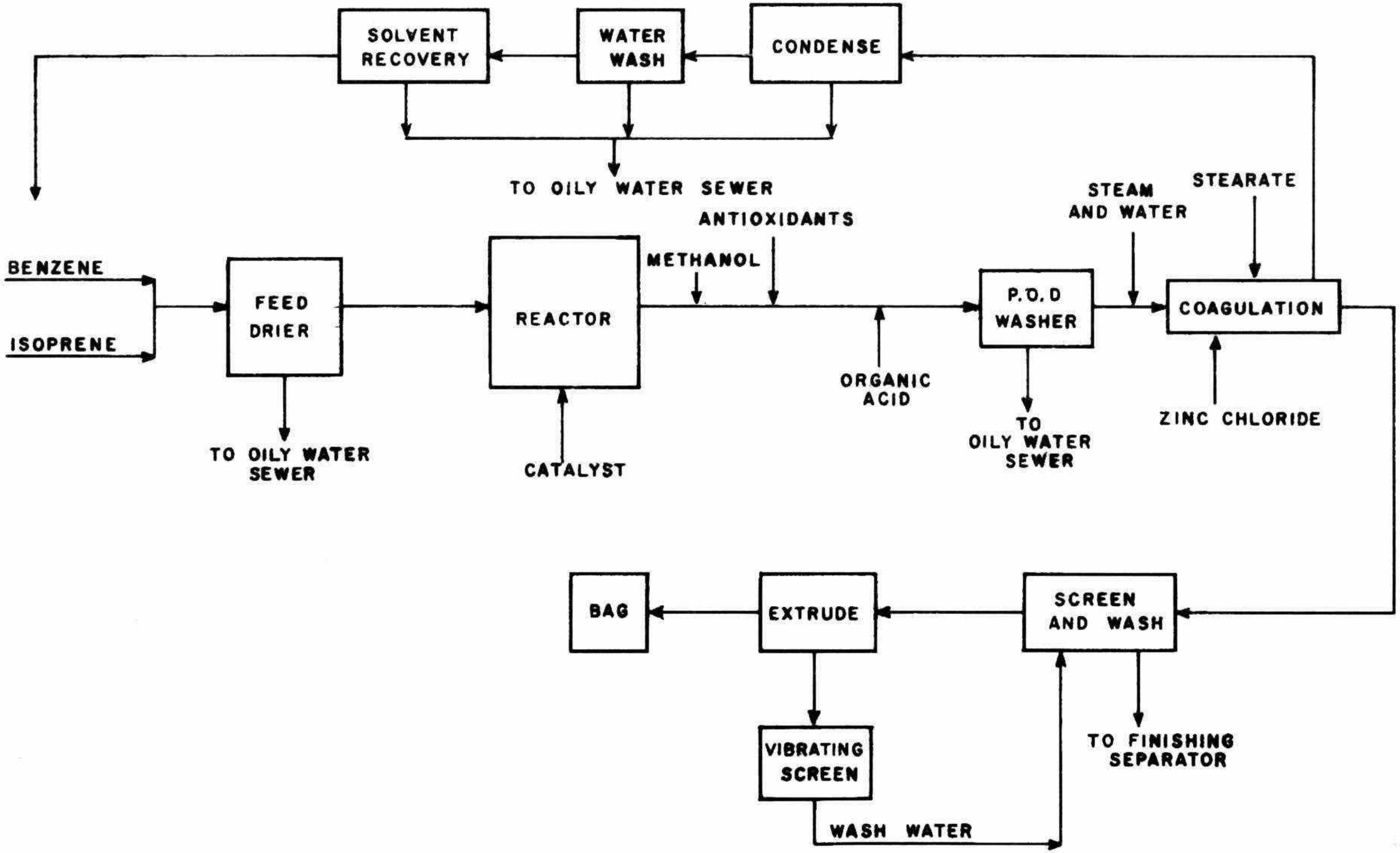


DIAGRAM NO. 2 POLYISOPRENE PROCESS



The coagulation of the rubber involves the addition of E.D.T.A. and T.S.P. as complexing agents, potassium stearate and zinc chloride as antiagglomerants and steam and water as coagulating agents. The resultant crumb in water is dewatered dried and baled.

The hydrocarbon flashed off at the coagulation step is condensed, washed and distilled for recycling.

At the time of the survey this polymer was not being produced.

III Bromobutyl

(a) Raw Materials

butyl rubber crumb
hexane
bromine
sodium hydroxide
inorganic salts

(b) Process Description (Diagram # 3)

A slurry of butyl rubber is pumped to the Stereo Unit from the Butyl Unit, dewatered upon arrival and added to the reactor system. Hexane is also added at this point to dissolve the butyl crumb. During the subsequent residence time in the reactors, the crumb is simply dissolved. The dissolved crumb (cement) enters a vessel where it is brominated. The acid formed in this halogenation reaction is then neutralized with sodium hydroxide. The cement is normally centrifuged to remove a portion of the water added at the bromination and neutralization steps.

The coagulation step requires that steam and water be added to flash off the hexane. The rubber crumb slurry then proceeds to the finishing area where it is dewatered, dried and baled.

A solvent recovery system is employed to collect and recycle the hexane flashed off at the coagulation step.

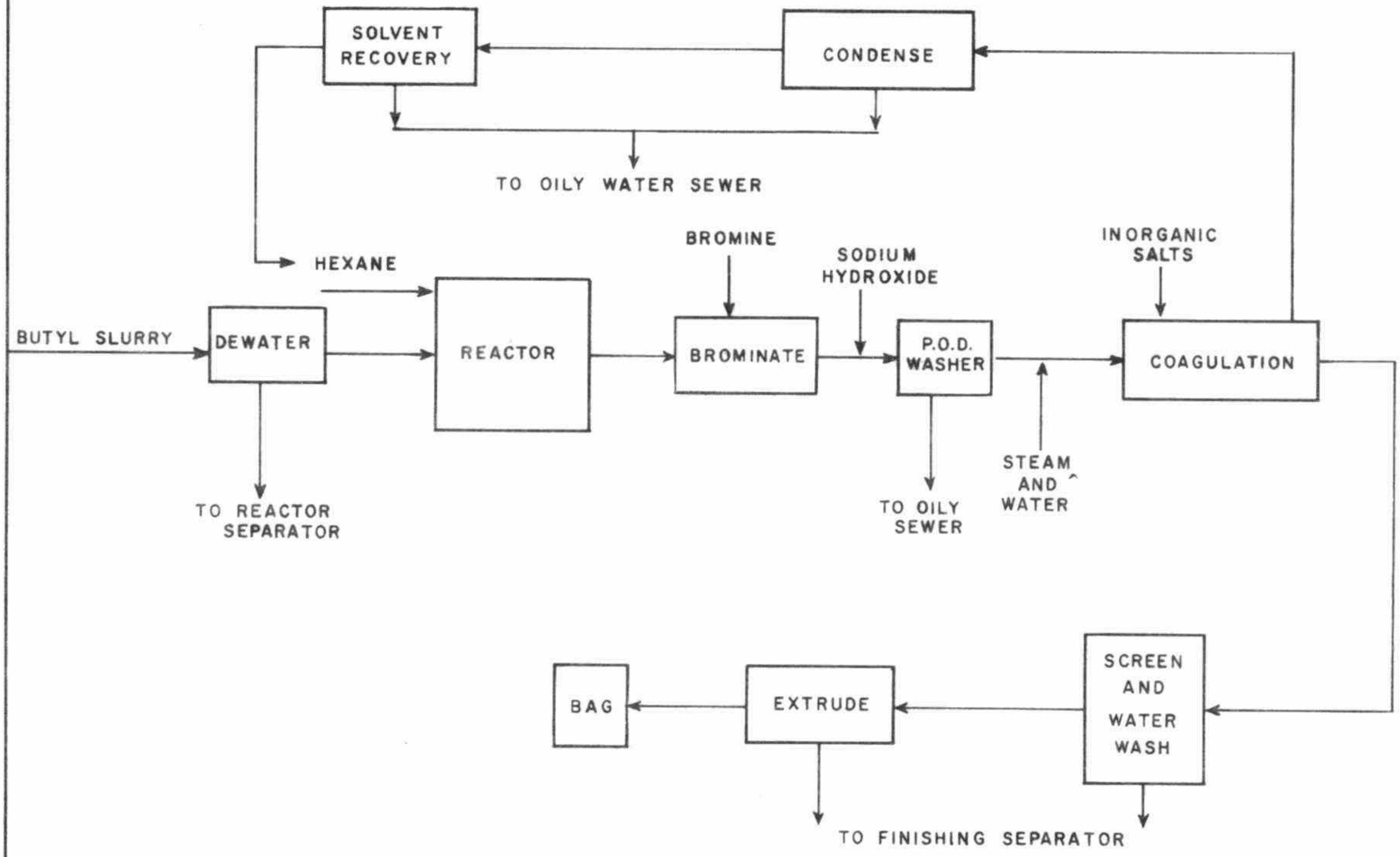
B. SOURCES OF LIQUID WASTES, TREATMENT AND DISPOSAL

Diagram 4 illustrates the wastewater flows from the Stereo Unit.

As shown on the block diagram, the largest contributors to the total unit effluent are the recovery and refrigeration cooling water flows which discharge directly to the 72" sewer. These flows are cooling discharges only and should not contain any process wastes. Effluent streams which contain process wastes are discharged via the finishing, reactor and oily water separators.

Wastes from the dewatering, drying and baling area of the process which are contaminated predominantly with suspended rubber particles are treated in the finishing separator. This separator utilizes two bays, each with a 56,700 gal. capacity and an average total retention time of approximately 5 hours. The retained rubber crumb is

DIAGRAM NO. 3 BROMOBUTYL PROCESS



clammed out and disposed of as a land burden at the Company's dump site approximately once a month. The separator had been clammed out the week before the sampling survey. The effluent from the separator is discharged to the 72" sewer and finally to the river.

The reactor separator treats wastes which originate from floor drainage and equipment cleaning in the reactor and coagulation areas. This waste flow contains rubber particles and solvent. The separator system consists of a sump which initially separates large rubber particles in order that they can be scooped out for disposal. The lower aqueous phase in the sump is pumped by means of steam ejectors to a 5,300 gallon single channel separator with an approximate 2 hour retention time where additional rubber particles are retained for removal. At the time of the survey this waste flow discharged to the 72" sewer, however, plans called for the redirection of this stream to the oily water API separator.

The oily water separator receives wastes from the water wash drums, the condensate legs, the podbielniak and the extraction tower in the recovery and tank farm areas. This waste flow contains free oil and hydrocarbons such as benzene, hexane and methanol. The separator has two channels with a total capacity of 20,000 gallons and a retention time of approximately 1.5 hours. This separator discharges directly to the St. Clair River.

C. SAMPLE POINT LOCATIONS

1/ Service Water - process water header in Utilities Building

2/ Finishing Separator Influent - influent trench prior to separator

3/ Finishing Separator Effluent - discharge of collection pit

4/ Reactor Separator Influent - discharge from steam ejector nozzle

5/ Reactor Separator Effluent - discharge of collection pit

6/ Oily Water Separator Influent - May 23 - entrance chamber of separator
- May 24, 25 - manhole (16 + 88S, 27 + 43D) prior to the separator using a vacuum pump

7/ Oily Water Separator Effluent - discharge of collection pit

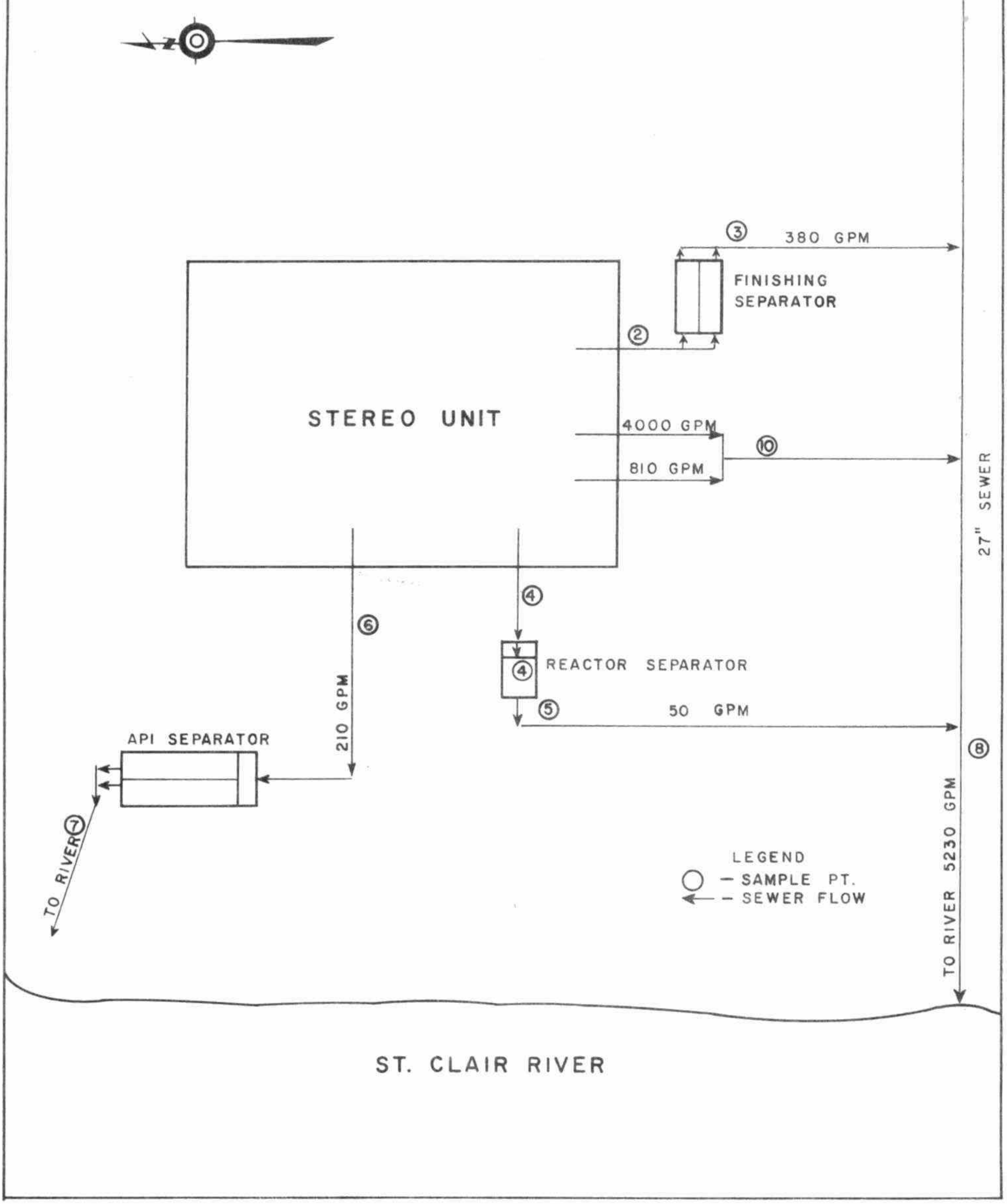
8/ 72" Sewer Discharge - manhole (18 + 50S, 27 + 43W) prior to discharge to the River

9/ Extraction Tower - discharge to oily water sewer

10/ Refrigeration and Recovery Effluent - manhole (17 + 81S, 25 + 25W) prior to discharge to the 72" sewer

11/ Condensate Boot D416 - discharge to oily water sewer

DIAGRAM NO. 4 STEREO UNIT WASTE WATER FLOWS



D. DISCUSSION OF RESULTS

(a) Effectiveness of Treatment System

Table I provides the analytical data on the samples collected. The net concentrations and waste loadings derived from the analytical results of these wastewater samples are shown in Table II. From the results as shown in both Tables I and II the effectiveness of the three waste treatment systems can be assessed.

It can be seen that the finishing separator was approximately 60% effective in reducing the suspended solids concentration in the finishing area wastewater stream. Although this reduction is considered significant, a comparison with 1968 OWRC results indicates that the suspended solids waste loading in the discharge from this separator has increased approximately 30 percent. Similar or greater increases in waste loadings are also evident in the BOD, COD and ether extractable results. Only the phenol concentrations have been reduced since the last survey. This is probably due to the replacement of the manufacture of the normal polymers produced at this unit by the production of bromobutyl polymers during the period of the survey. In the production of bromobutyl rubber at the Stereo Unit, the phenolic antioxidant is added at the Butyl Unit.

It is suspected that the phenol concentration in the finishing separator will rise when the production of bromobutyl rubber is replaced with the production of polymers normally produced at the Stero Unit. A separate bromobutyl production facility is to be completed during 1973, and at that time, bromobutyl rubber will no longer be produced at the Stereo Unit.

The overall increases in the finishing separator waste loadings as illustrated in Table II may be due to increased production in the unit since the 1968 survey. According to Stereo personnel, additional increases in production are probable in the future.

Unlike the 1968 survey, the net concentrations of the discharge stream from the finishing separator for suspended solids, B.O.D., and phenols are equal to or exceed Ministry objectives. This discharge therefore relies on dilution from cooling water streams to meet Ministry concentration objectives for discharge to a watercourse.

The contaminant concentrations of the influent and effluent streams at the reactor separator indicate that this system does not reduce the quantity of any of the waste parameters. The samples, however, were selected from the ejector nozzle and therefore do not indicate how successful the sump prior to the separator is for removing contaminants.

Visual observations during the survey indicated that the sump is successful in removing large amounts of solids. The function of the separator therefore appears to be as a back-up system in the event that solids escape the sump.

The results obtained on the samples collected from the discharge of the reactor separator indicate that this waste stream is not acceptable for discharge to a watercourse.

The Stereo oily water separator, as can be seen in Table II, was operating under a reduced load at the time of the survey when compared to the 1968 influent loadings. This reduction may be due, in part, to the decreased use of the extraction tower during bromobutyl production and the temporary elimination of the podbielniak discharge while repairs were being made to the extractor. An increase in loading may result when bromobutyl is replaced by regular Stereo products and the podbielniak is repaired. The extent of the possible loading increase cannot be accurately determined.

The laboratory results indicate that the Stereo oily water separator was 30% effective in removing the BOD and COD and 70% effective in removing TOC. This would suggest that a substantial portion of the organics present are refractory in nature.

(b) Battery Limits

The Stereo Unit battery limit effluents, unlike other unit effluents in the Polymer complex, discharge directly to the St. Clair River. These include the Stereo oily water separator and the 72" sewer.

At the time of the survey it was determined that the effluent stream from the 72" sewer was acceptable for discharge to a watercourse, for those parameters measured.

The oily water separator however discharges high concentrations of dissolved organics to the River, as evidenced by the COD and TOC values in Table I. These dissolved organics could include methanol, butadiene and benzene.

It is evident in Table I, that the individual T.O.N. results for this separator on the second sampling day were lower than on the first or third days. On the second day, the discharge from the condensate boot, D416, which handles bromobutyl flows, was removed from the oily water separator influent and directed to the 72" sewer while the boot was down for repairs. Noting the TON of the effluent from this boot, it can therefore be assumed that an improvement in threshold odour at the Stereo Unit will occur after completion of bromobutyl production.

A sample was obtained of the oily water separator effluent to be analyzed for benzene. Unfortunately the bottle was broken at the laboratory and no results are available. However, it should be pointed out that in the past, Ministry personnel have noted conditions that suggested gross amounts of solvent (benzene) were being discharged from the oily water separator, presumably during the production of regular Stereo products. Although, it has been stated above that bromobutyl production may be responsible for poor performance during the survey for parameters such as TON, it may also be responsible for improved performance with respect to the discharge of hydrocarbons such as benzene

E. CONCLUSIONS AND RECOMMENDATIONS

(a) The quality of the water discharged from the finishing separator has deteriorated since the 1968 survey with respect to suspended solids, B.O.D. and ether extractables and it is suspected that increased production could cause further deterioration. It is therefore recommended that Polymer Corporation Limited investigate the possibility of improving the quality of the water discharged from the finishing building. Possible improvements in this area could include recycling a portion of the wastewater, screening and reclaiming the rubber crumb prior to the separator and optimization of water usage in coagulation.

(b) The loading at the Stereo oily water separator may increase when the production of bromobutyl products is replaced with the production of regular Stereo products. The separator should therefore be resampled in the future when this change in product emphasis has been effected.

(c) The organics in the wastewaters discharged from the oily water separator are more concentrated than the organics discharged by any other outfall in the Polymer complex. As noted previously, benzene has also been evident in the effluent from the separator. It is therefore recommended that Polymer alleviate this situation by improving the efficiency of the solvent recovery operations and by optimizing water usage throughout the unit. It is also recommended that Polymer Corporation Limited initiate an investigation to determine the causes of the solvent discharges and to identify possible solutions.

STYRENE UNIT

The Styrene Unit which has been in operation since 1967, has a design capacity to produce 200 million lb/yr of 99.8% styrene. The unit consists of three separate areas, each completing a step in the production of styrene from a light oil feed stock. These areas are known as the benzene, ethylbenzene and styrene areas.

A PROCESS

I Benzene

(a) Raw Materials

Coke oven light oil
sodium hydroxide
monoethanolamine

(b) Process Description (Diagram # 5)

Light oil received from the steel industry's coking plants is initially vacuum distilled to reject C9's and heavier material. The overhead plus recycle toluene and xylene is vapourized by contact with a stream of hot hydrogen prior to entering the pretreat reactor. During the subsequent residence time in the reactor, most unsaturated hydrocarbons are hydrogenated to the corresponding saturates. This saturated stream is then heated up to hydrodealkylation temperature and directed to the Litol reactor. The reactor uses a confidential fixed bed catalyst to hydrodealkylate the heavier aromatic components in the stream to benzene.

Reactor product is quenched by previously cooled product before passing through an exchanger system for condensation. The product enters a flash drum where the gas phase is separated and treated in a monoethanolamine scrubbing system to remove hydrogen sulphide. After purification the gas is combined with a hydrogen rich stream from the Styrene area which has been scrubbed free of carbon dioxide. A portion of the total gas stream is purified cryogenically in the Hydrogen Purification Unit and then recombined with the main gas stream before being returned to the feed vaporizor.

Liquid product from the high pressure flash drum is pressured to a stabilizer and finally to the benzene distillation column. Light gases are rejected from the stabilizer to the fuel gas system. The product benzene from the distillation column is caustic scrubbed and sent to storage.

II Ethylbenzene

(a) Raw Material

benzene
ethylene
ethylchloride
aluminum chloride
sodium hydroxide

DIAGRAM NO. 5 BENZENE PROCESS

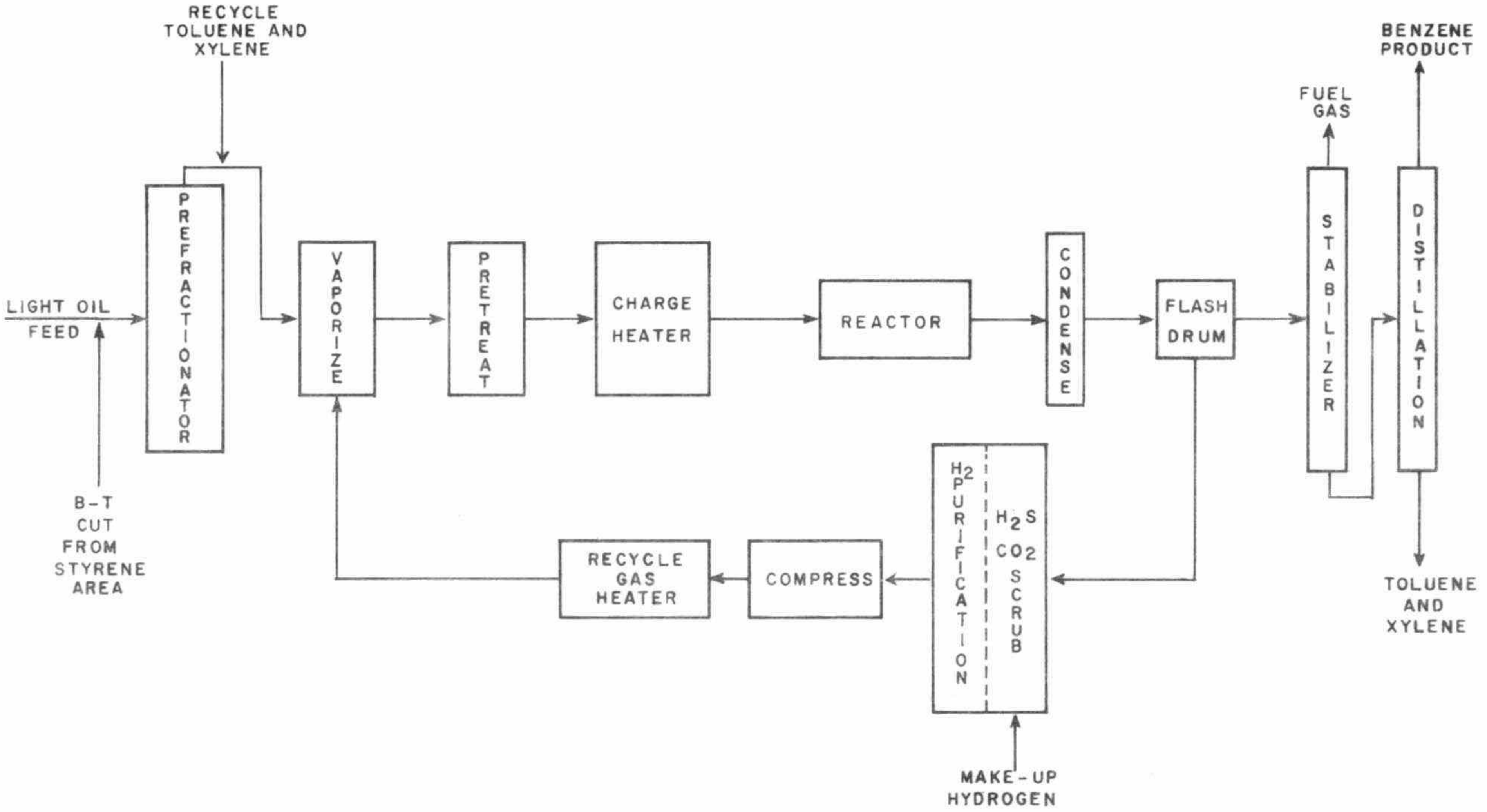
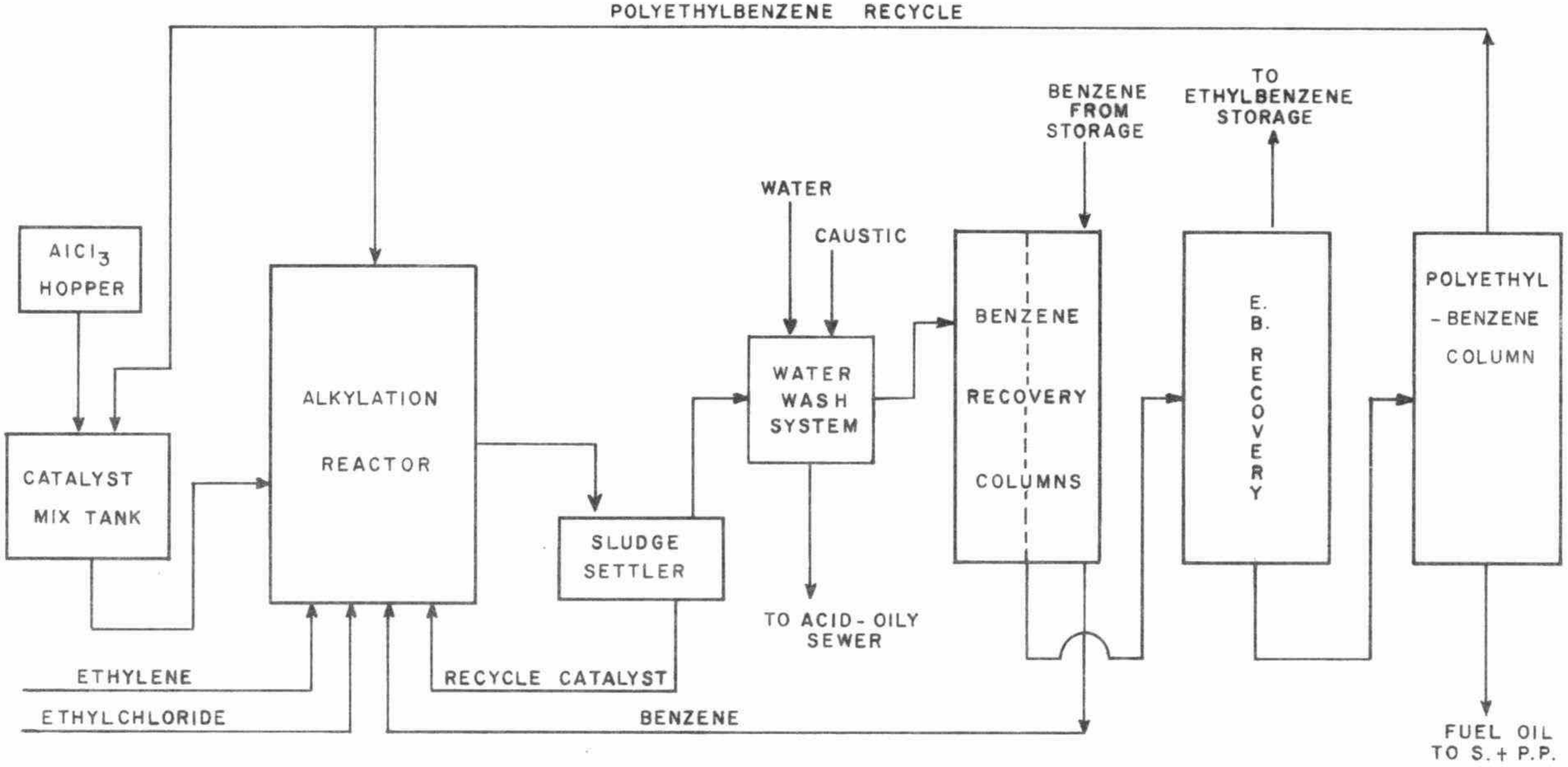


DIAGRAM NO. 6 ETHYLBENZENE PROCESS



(b) Process Description (Diagram # 6)

Benzene, ethylene, aluminum chloride and ethyl chloride are fed into a reactor where the aluminum chloride forms a catalyst complex. Ethylchloride reacts with benzene in the presence of the catalyst to produce ethylbenzene and a catalyst promoter, hydrogen chloride.

The reactor product consists of a mixture of benzene, ethylbenzene, polyethylbenzenes, aluminum chloride and a small amount of fuel oil. The catalyst complex is settled out in a crude ethylbenzene product settler and recycled to the reactor. The last traces of the catalyst are removed by caustic scrubbing and water washing and the resulting mixture is distilled to remove the unreacted components. Of these components, benzene is redistilled to remove any water before recycling. The separated polyethylbenzenes are distilled for recycle and the heavy oil residue is rejected as fuel oil for the Steam and Power Plant. Ethylbenzene is stored as feed to the styrene process.

III Styrene Process

(a) Raw Materials

Ethylbenzene
sulphur
para - tertiary butylcatechol

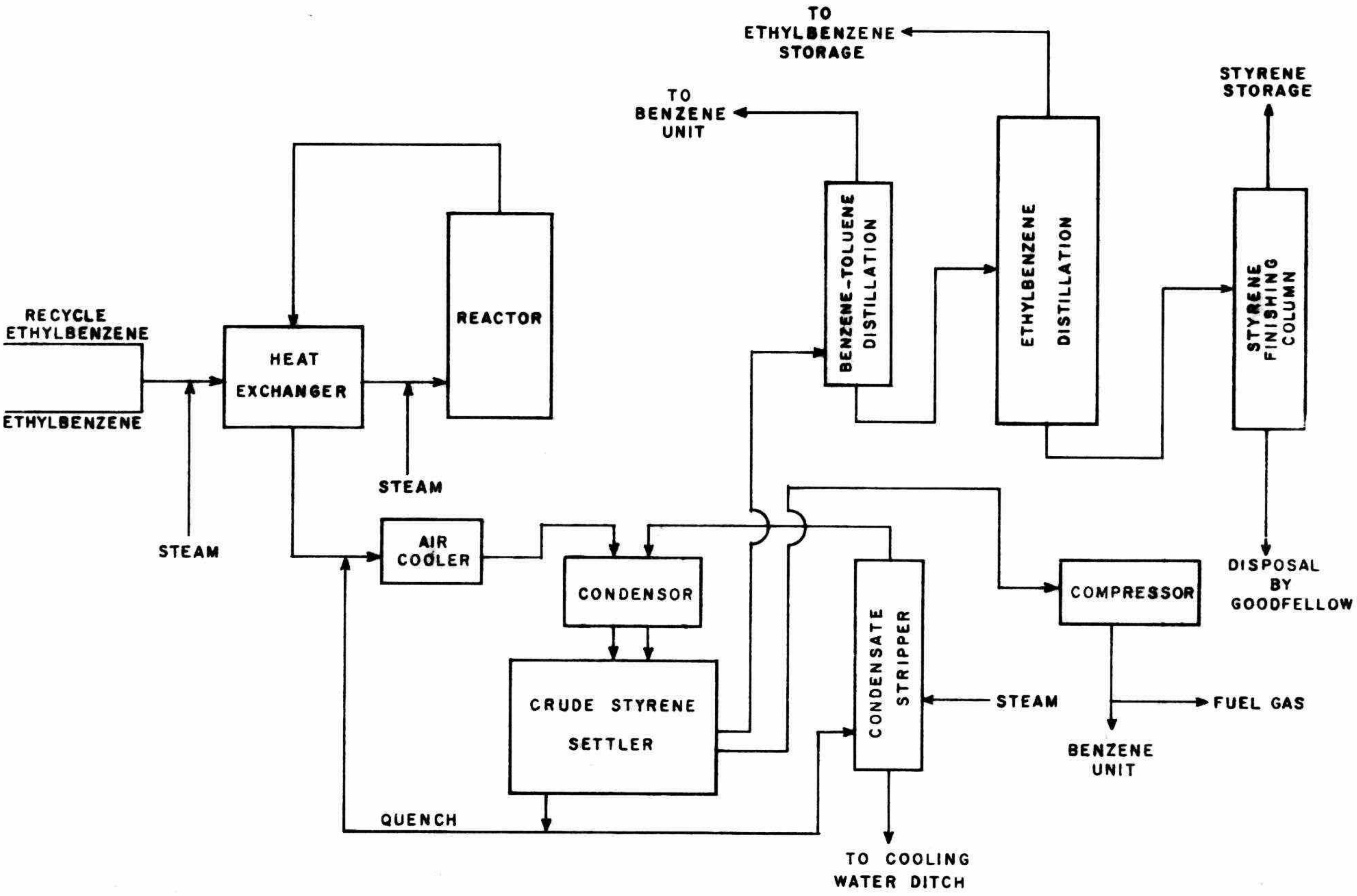
(b) Process Description (Diagram #7)

A mixture of ethylbenzene from storage and recycle ethylbenzene is vaporized with steam and passed over an iron oxide catalyst bed at high temperatures. This catalyst dehydrogenates the ethylbenzene to styrene plus non selective by-products.

The reaction product of benzene, toluene, styrene, unreacted ethylbenzene and tar is condensed and separated from the steam condensate in a settling drum. The steam condensate is steam stripped to remove hydrocarbons and sewered. The vent gas which is produced in the dehydrogenation reaction is initially compressed to recover condensable hydrocarbons and then distributed to the Benzene area and the fuel gas system.

Condensed crude styrene which has been separated in the settling drum is pumped to a distillation column. Sulphur is added to the stream prior to the column to retard polymerization. The initial distillation is carried out under vacuum and removes benzene and toluene which are recycled to the benzene area. The unreacted ethylbenzene is separated in a second distillation tower and recycled to the ethylbenzene dehydrogenation reactors. The third distillation step removes all remaining tars from the styrene. Para-tertiary butylcatechol is added as a polymerization inhibitor before storage.

DIAGRAM NO. 7 STYRENE PROCESS



B. SOURCES OF LIQUID WASTES, TREATMENT AND DISPOSAL

Diagram 8 schematically illustrates the sources and disposal of liquid wastes from the Styrene Unit. As shown on the block diagram, the following flows combine to form the total unit effluent.

1. Oily treatment system effluent
2. Acid-oily treatment system effluent
3. Stripper bottoms
4. Flare seal drum effluent
5. Cooling water
6. Storm sewer water

The oily treatment system receives wastes that originate within curbed areas at the unit. These wastes are comprised of many small and intermittent flows such as pump drips and purges rather than one large or continuous flow. This results in a flow rate that is continually fluctuating.

Oily wastes are initially collected in a sump and are periodically pumped to a separation drum with a 660 - gallon capacity and a 0.5 hour average retention time. The upper oil phase is pumped from the drum to the Benzene area and recycled to the process. The lower aqueous phase is forwarded to a double bay API separator with an overall average retention time of 7.5 hours. The oil from the separator is returned to the Benzene area as a feed and the water is discharged to the cooling water ditch. The discharged stream contains some free oil and dissolved hydrocarbons.

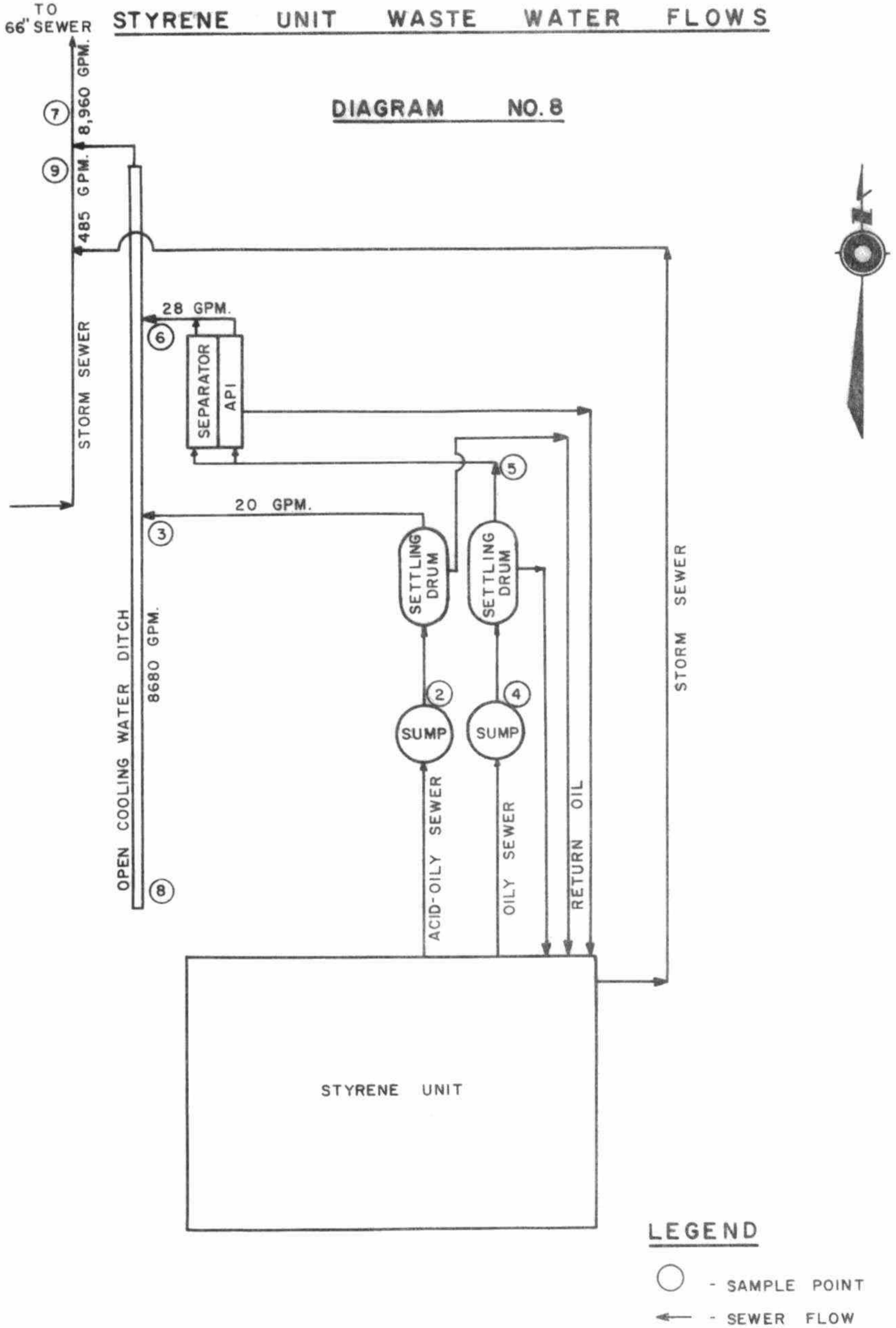
Acid-oily wastes originate within the ethylbenzene reactor area. This waste stream consists of many small flows such as pump drips and purges that may occur within the curbed area as well as one large and continuous flow from the water and caustic scrubbing system. The total waste flow contains spent aluminum chloride catalyst as well as free oil and dissolved hydrocarbons.

Acid-oily wastes are initially collected in a sump and intermittently pumped to a 5,000 gallon separation drum with an average retention time of 4.5 hours. The upper oil phase is returned to the Ethylbenzene area for recycle and the lower aqueous phase is discharged to the cooling water ditch. Upon contact with the cooling water, the aluminum is precipitated as aluminum hydroxide and settles to the bottom of the ditch. The discharge from the drum contains free oil, aluminum, chlorides and dissolved hydrocarbon.

It should be noted that the acid-oily system is segregated from the oily system because hydrochloric acid can upset the benzene process if it is present in the recycled oil.

STYRENE UNIT WASTE WATER FLOWS

DIAGRAM NO. 8



The flow from the bottoms of the steam condensate stripper at the Styrene area is directed to the cooling water ditch. Due to the large flow and the high phenol concentration, this stream contributes substantially to the phenolic loadings of the total unit effluent.

The effluent from the flare seal drum is discharged untreated to the cooling water ditch. This small but highly odourous flow contains hydrogen sulphide and dissolved hydrocarbons.

The cooling water stream from the unit also discharges directly to the concrete ditch. Since this flow is cooling water only, it should not contain large amounts of contaminants.

All aqueous flows that are not collected in the curbed areas within the unit eventually enter the storm sewer. As expected this storm sewer flow will fluctuate in relation to the amount of rainfall received. During the summer months, however, the stream also contains a water deluge from the styrene storage tanks. This deluge is used to maintain the stored styrene at a low temperature in order to inhibit polymerization. The total storm sewer flow can contain free oil.

C. SAMPLE POINTS AND LOCATIONS

1. Service Water

   - cooling water header

2. Acid-oily Drum Influent

   - sump pump discharge to drum. This sample was taken by drawing off a small portion of the flow through the pumping cycle.

     This method was chosen since a representative sample was difficult to obtain due to the two phase nature of the material.

3. Acid-oily Drum Effluent

   - drum discharge

4. Oily Drum Influent

   - sump pump discharge to drum. This sample was obtained by employing the method described for Sample #2.

5. Oily Drum Effluent

   - drain valve on discharge line from the drum to the API separator

6. API Separator Effluent

   - prior to the final weir of the separator. Due to the low flow in this separator, a sample taken from the discharge pit would not have been representative.

7. Unit Effluent to 66" Sewer

   - vacuum pump station

8. Cooling Water

   - open cooling water ditch

9. Storm Sewer
   - manhole situated 5 feet south of the vacuum pump station

10. Surface Runoff
   - small drainage trench within the unit. This small flow discharged to the storm sewer.

11. Stripper Bottoms
   - pump discharge to the cooling water ditch

12. Flare Seal Water
   - pipe discharge to cooling water ditch.

D. DISCUSSION OF RESULTS

(a) Effectiveness of Treatment Systems

The analytical results as shown in Table III indicate the effectiveness of the unit treatment systems. However conclusions pertaining to the effectiveness of the two separation drums may not be accurate due to the difficulty and unreliability of the method used to obtain the influent samples. This unreliability can best be seen on the acid-oily drum results, where the influent concentrations for all parameters except phenols are lower than those of the effluent. The results obtained for the effluent stream from this drum, however, can be utilized and indicate that this system discharges substantial concentrations of dissolved organics and chlorides. The concentrations of dissolved solids, BOD, phenols and chlorides as well as the pH were not within the values considered acceptable by this Ministry for wastewaters discharging to a watercourse.

The results as shown for the effluent stream of the oily drum indicate that this discharge also has high concentrations of BOD, COD,TOC, TON and phenolics. However, this stream is afforded additional treatment in the double bay API separator.

Utilizing the effluent results of the oily drum along with the June 6,7 and 8 effluent results for the API separator effluent, the ability of the separator to remove contaminants can be interpreted. It would appear that the separator is serving as a back-up system for the settling drum as influent and effluent oil concentrations are essentially unchanged. The discharge from this separator contains high concentrations of COD, TOC, BOD and phenolics and exhibits a high TON. It is clearly evident that this discharge contains high concentrations of dissolved organics which are likely to be comprised of benzene, ethybenzene and styrene.

It can further be seen by examining the results obtained on July 5 and comparing these to the June results that the TOC and phenol concentrations in the API effluent stream can exhibit significant fluctuations. Since the BOD and COD values did not fluctuate, the increased TOC signifies an increase of aromatic hydrocarbons such as benzene which may not be measured completely by oxygen demand test methods.

(b) Battery Limits

As shown on Table IV, the waste concentrations for the total Styrene Unit effluent were within the Ministry's objectives at the time of sampling for all waste parameters measured except phenols.

The high phenol concentration (77ppb) is significantly above the Ministry objective (20ppb) for wastewaters discharging to a watercourse and results in almost ten pounds/day of phenols being discharged to the River. This loading is more than 25% greater than that found during the 1968 OWRC survey.

It is suspected that these phenolic compounds enter the unit as a fraction of the coke oven light oil and/or are produced as side reactions during the manufacture of styrene. The phenols are then discharged with other free or dissolved hydrocarbons via the acid-oily, oily or stripper bottom effluent streams. Some phenolic compounds are also discharged by the cooling water stream. This may be caused by leakage in the heat exchanging systems. The leak may be confirmed by visual observations of an apparently continual brown scum on the surface of the cooling water flow.

The sources of approximately 60% of the phenol loading cannot be identified. This imbalance may have been caused by the method employed to obtain the sample. Since the sample was a grab rather than a composite it may not reflect accurately the normal conditions of this effluent stream.

A high BOD loading for the total unit effluent is also evident in Table IV. Although this BOD value does not appear to be substantiated by the COD results, it should be noted that the laboratory submitted a range of from 0 to 30 ppm COD as the analytical result. The selection of the mean of this range (15 ppm) for both service water and waste discharge results produced a net concentration of zero. If more realistically however, a number such as 25 ppm was selected for the effluent samples and 15 ppm for service water, agreement between BOD and COD would be evident.

Material exhibiting a BOD and a COD originate in this unit from the acid-oily, oily and also the cooling water discharge flows. Although the oily and acid-oily flows contain the most concentrated contaminants, the cooling water stream, due to its large flow contributes the largest loadings. This BOD value for the cooling water along with the phenol results, further indicates the presence of a contaminated flow, possibly due to a leak.

A small but poor quality stream also enters the plant effluent flow from the flare seal drum. Although the concentration is high, the low volume is easily absorbed into the main flow. Initial impressions may indicate that the stream contributes to the total TON discharged from this unit. The odour from the stream, however, is caused by the presence of hydrogen sulphide which will probably flash off upon entering the warm cooling water ditch.

The data as discussed above clearly suggests that the wastes discharged from this unit contain dissolved hydrocarbons which are likely to be benzene, styrene and ethylbenzene. When compared to the loadings discharged from other sources, the loadings discharged from the Styrene Unit, although significant, are relatively small.

E. CONCLUSIONS AND RECOMMENDATIONS

(a) The Styrene Unit contributes more phenolic compounds (9.9 lb.) to the St. Clair River than any other unit in the Polymer Complex. It is recommended that Polymer Corporation Limited accurately identify the individual sources of phenolic contamination and initiate an investigation to determine possible methods of treatment.

(b) It has been noted in the discussion that a leak may be present in the unit cooling system that results in approximately 1,125 lb./day of BOD being discharged via the cooling water ditch. It is recommended that Polymer determine if such a leak exists and take any necessary corrective action.

(c) Dissolved hydrocarbons such as styrene, ethylbenzene and benzene are present in the plant discharge. Because of the potential effects on aquatic biota of even small loadings of these materials it is recommended that Polymer investigate measures to eliminate or substantially reduce the quantities presently being discharged from this unit.

(d) The operation of the fixed-bed catalysts employed in the Benzene process should be examined to determine whether there is a loss of catalyst to the sewer system.

COPOLYMER UNIT, BUTYL UNIT AND LATEX UNIT

For the purposes of this industrial wastes survey, the Butyl and Latex Units were grouped with the Copolymer Unit because of the common utilization of the Graver and associated systems for waste treatment.

The Copolymer Unit, as the name implies, produces an assortment of copolymer rubbers using an emulsion polymerization process. The unit, which has been on stream since 1943, produces 250 million pounds of styrene-butadiene and acrylonitrile - butadiene copolymers annually.

The Butyl Unit has been on stream since 1944 and currently produces approximately 97 million pounds per year of Butyl rubber. This unit utilizes a solution polymerization process.

The Latex Unit has been divided into the #1 and #2 Latex Plants. The #1 plant, which has been in production since 1958 produces approximately 50 million pounds per year of concentrated latex from base latices supplied by the Copolymer Unit. The #2 plant has been producing approximately 40 million pounds per year of carboxylated copolymer latices.

A. PROCESS

I Raw Materials

styrene
butadiene
acrylonitrile
divinyl benzene
ethyl acrylate
vinyl pyridene
ethoxy ethyl acrylate
rosin acid
fatty acid
oleic acid
alkyl benzene sulfonic acid
di sodium salt of half ester of sulfo-succinic acid
potassium chloride
tri sodium phosphate
potassium, sodium hydroxides
ferrous sulphate
sodium formaldeyde sulfoxylate
ethylene diamine tetra acetic acid
hydroperoxides
assorted mercaptans
alum
lime
calcium chloride
sodium chloride
sulfuric acid
glue (bone)
polyamines
mixed alkylated diphenyl paraphenylene diamines
alkylated triphenyl phosphite
methylene binonylated para cresol
mixed napthenic, aromatic oils
carbon black
diphenylamine

(b) Process Description (Diagram #9)

As previously noted, the polymers produced at the Copolymer Unit are categorized into either the butadiene - styrene or the acrylonitrile - butadiene classifications. Since the processes for each classification are similar, only one process description will be given. Any differences will be noted within the text of the description.

Monomers, received from either the Petrochemicals area of the Polymer plant or from outside sources are stored in the Tank Farm area. The Tank Farm area serves not only as a storage facility but also as a pumping and metering area for the monomers.

The monomers are initially directed to the reactor area of the unit, where they are mixed with a soap solution. This soap solution, which is produced in the pigment make-up building, forms an emulsion with the monomers thereby allowing maximum reactivity. The emulsion also will retain the rubber particles, when formed, in a colloidal suspension.

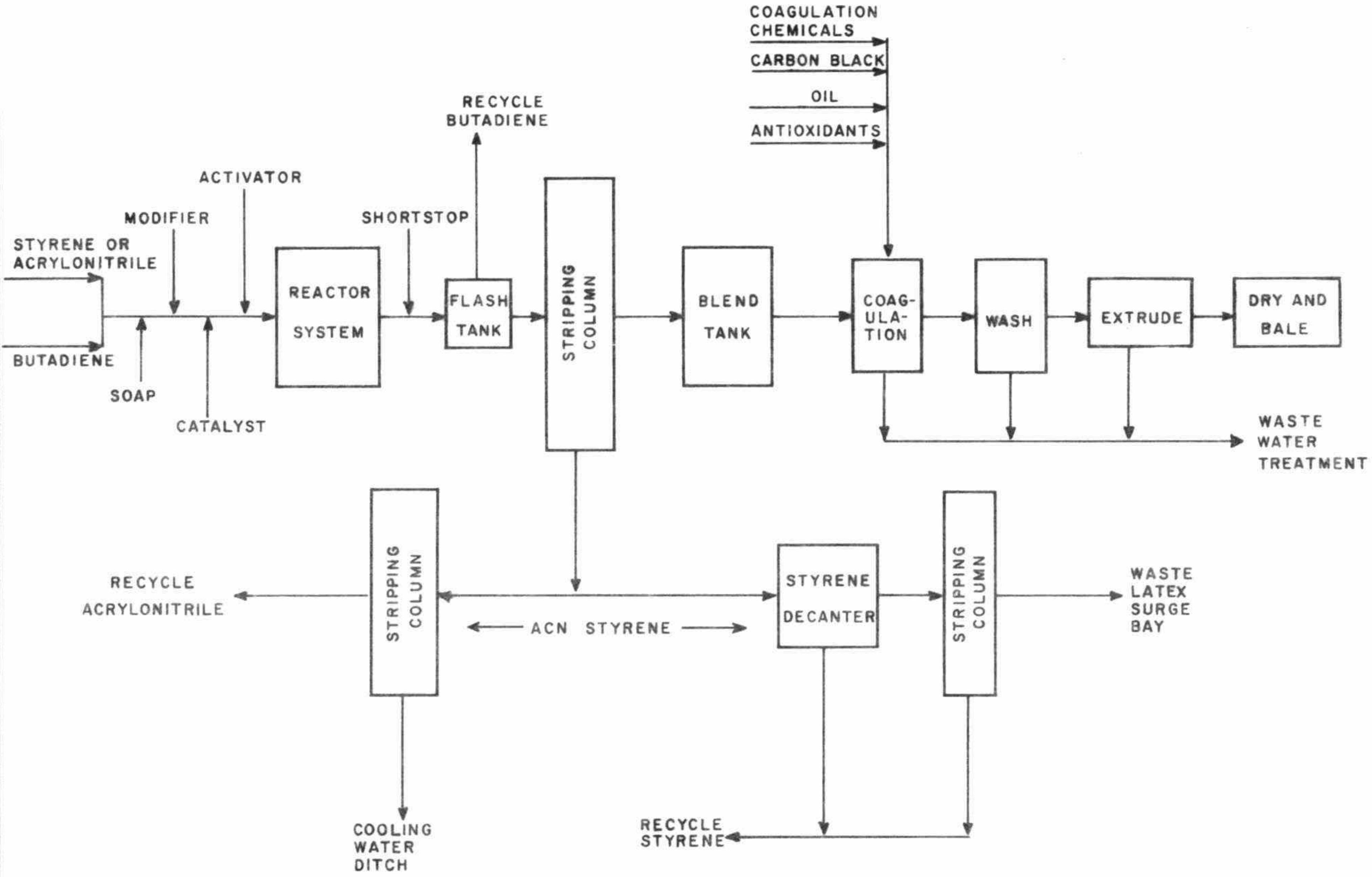
A hydroperoxide catalyst, a complexed iron activator and a mercaptan modifier are metered into the emulsion before it enters the agitated reaction vessels. In the Copolymer Unit, there are five reactor systems.

Four of these systems are equipped with eight to twelve reactors in series and are employed for continuous polymerization. The fifth system consists of a number of batch or single reactors that are utilized for development work or for producing special copolymers. A recycled brine coolant is used throughout.

After the desired proportion of monomer has been converted to the polymeric form in the reactor, the reaction is stopped by the addition of a shortstop such as diethylhydroxylamine. The product latices then proceed to a flash drum where unreacted butadiene is flashed off. The butadiene is returned to the Butadiene Unit for purification and eventual recycle.

The flashed latex is then continously steam stripped in a stripping column to remove the unreacted styrene or acrylonitrile. The stripped latex proceeds to the blend tanks for blending and storage or is pumped to the Latex Unit for further processing. Latex produced in the batch reactors is batch flashed and stripped in strippers located beneath each of the reactors before being sent to storage.

DIAGRAM NO. 9 SBR/NBR PROCESS



The styrene from the stripping columns is collected in a hot well and directed to the styrene decanter. Free styrene from the decanter is recycled and the water phase is stripped to remove dissolved styrene in two parallel water stripping columns. Styrene is recycled and the water is discharged to the Waste Latex Surge Bay. In the case of acrylonitrile, the aqueous discharge from the latex stripping column is stripped of recyclable acrylonitrile and the water is discharged with the Copolymer cooling water.

After storage in the blend tanks, latex is directed to any one of seven finishing lines, where it is coagulated using a combination of several coagulation chemicals. These may include sodium chloride, alum, calcium chloride, sulphuric acid, lime, glue or a polyamine. At this point, an antioxidant, an extender oil, or carbon black may be added depending on the line being used or the final product desired.

The resulting crumb-in-water slurry is dewatered on a vibrating screen and reslurried with fresh process water to remove undesirable accumulations of salt. The slurry is again dewatered on a second vibrating screen and finally extruded, dried and baled.

II Butyl Unit

(a) Raw Materials

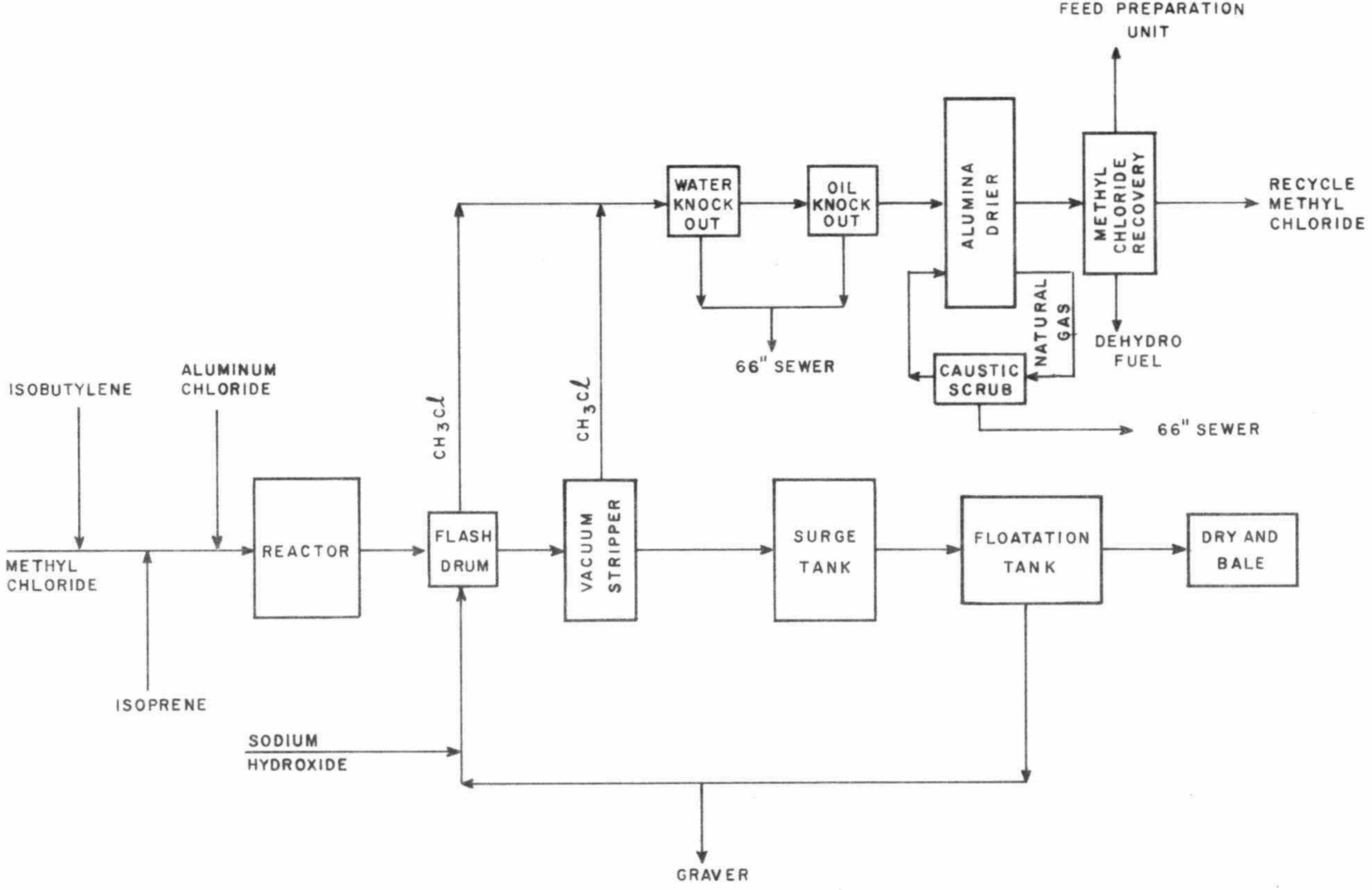
- isobutylene
- isoprene
- divinyl benzene
- methyl chloride
- aluminum chloride
- sodium hydroxide
- methane
- varsol
- stearic acid
- dodecyl dimethyl ammonium chloride
- mixed alkylated diphenyl amines
- unsaponified rosin and fatty acids
- isopropyl alcohol
- EDTA
- phenyl beta napthylamine
- alkylated triphenyl phosphate

(b) Process Description (Diagram #10)

Isobutylene received from the petrochemicals area of the Polymer Plant and isoprene from outside sources are initially dissolved in a methyl chloride solvent. A stream of aluminum chloride is added to this mixture to act as a catalyst before the total flow is directed to the reactor system.

The reactor product proceeds to a flash drum where it is mixed with return water from the flotation tanks and caustic to neutralize any hydrochloric acid formed by the catalyst. Methyl chloride is flashed off in this drum and the remaining methyl chloride is stripped from the product in a vacuum stripper.

DIAGRAM NO. 10 BUTYL PROCESS



The removed methyl chloride solvent is cooled, passed through a water knock out drum, compressed and passed through an oil knock out drum. The solvent is then dried in one of two alumina columns and forwarded to the methyl chloride recovery area for distillation before recycle. The alumina is regenerated by passing hot natural gas through the column. The gas is in turn scrubbed by caustic soda which is then discharged to the storm sewer approximately once per day.

The rubber crumb slurry proceeds from the vacuum stripper to a surge and finally a flotation tank. The crumb floats to the surface of the flotation tank and is skimmed, dried and packaged. The water is returned to the flash drum and a 10% purge is discharged to the Graver waste treatment system.

III Latex Unit

(a) Raw Materials

Styrene - butadiene latex
butadiene
styrene
carboxylated acids
acylamide
sulphated oleic acid
sodium lauryl sulphate
sodium salt of benzene sulphonic acid
sodium salt of polymerized alkyl napthlene sulphonic acid
octyl phenyl poly (ethylene oxg.) ethanol
potassium chloride
potassium carbonate
E.D.T.A.
sodium, potassium hydroxides

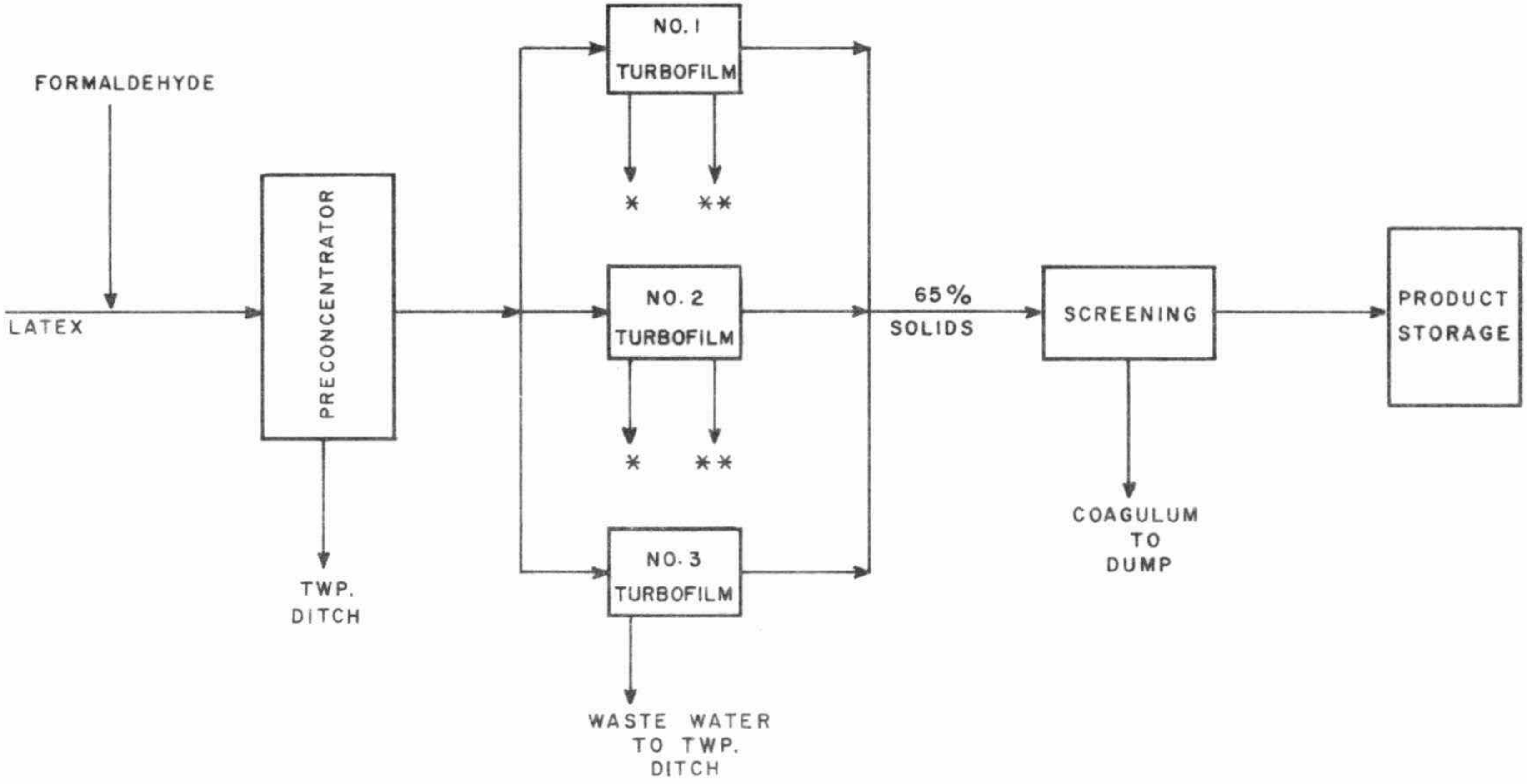
sodium hexameta phosphate
tetra sodium pyro phosphate
diammonium phosphate
ammonium persulphate
tertiary dodecyl mercaptan
silicone compounds
formaldehyde
1:2 benzisothiazolone
alkylated phenol
polymeric hindered phenol
aqua ammonia
partial sodium salt of n-lauryl-B-amino-dipropionate

(b) Process Description (Diagram # 11 & 12)

Latex plants #1 and #2 will be described separately in the process description since the processes involved are not similar.

Base latices are received from the Copolymer Unit at Latex Plant #1 and preserved with formaldehyde. These latices, are preconcentrated in a unit which is maintained under vacuum by 2-stage steam jets and a barometric condensor system. The stream then enters either #1, #2 or #3 turbofilms which will concentrate the latex further to 65% solids. Vacuum control on #1 and #2 turbofilms is achieved by means of 2-stage steam jets and non-contact shell and tube condensers. At the time of the survey, the #3 turbofilm employed a contact-type condenser, however this has since been replaced with a non-contact shell and tube condenser. The preconcentrator was changed to a non-contact condenser in December, 1972.

DIAGRAM NO. II LATEX NO. I CONCENTRATION PROCESS

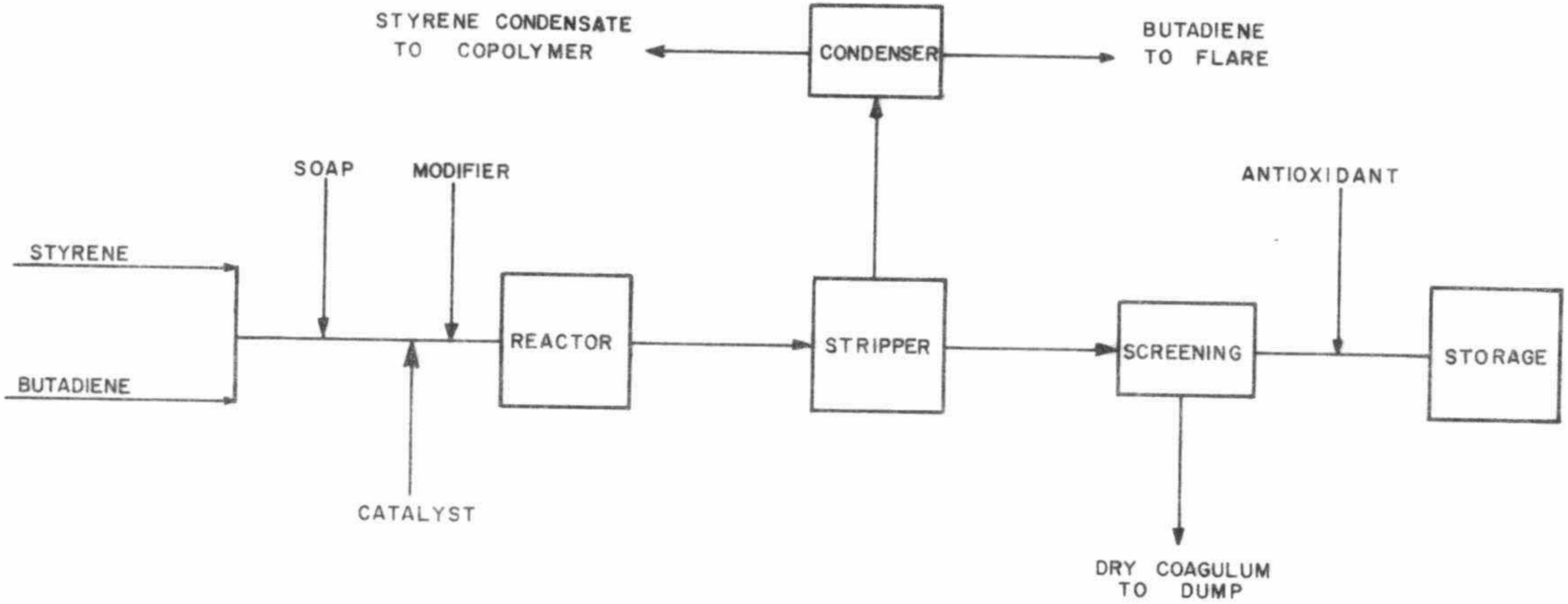


* - COOLING WATER TO TWP. DITCH

** - CONDENSATE TO WASTE LATEX PIT.

LATEX NO.2 PROCESS

DIAGRAM NO.12



The concentrated latex, is screened on a circular vibrating screen to remove coagulum and is placed in product storage.

The latex used in Latex Plant #2, is polymerized at the unit.

Butadiene and styrene, received from the Copolymer tank farm, are emulsified with a soap solution and pumped into a batch reactor after the required catalyst and modifier have been added. The resulting reaction is allowed to continue until approximately 96 to 97 per cent conversion has been attained. The latex is then dropped to the batch stripper which is situated beneath the reactor. At this point, the unreacted monomers are driven off to a condensing system. From this system the volatile vapours such as butadiene are flared and the styrene and condensate are sent to the Copolymer styrene recovery system.

The stripped latex is screened to remove coagulum and an antioxidant is added. The latex is stored until it is shipped.

IV Pilot Plant

Because of the diverse and proprietary nature of the processes performed in the pilot plant, a technical description will not be given. It can be stated however that this plant is involved in the polymerization, coagulation, finishing and compounding of various rubber and plastic compounds. All of the wastes derived from these processes would be discharged to the Copolymer pigment catch basin for eventual treatment at the Graver. These wastes could contain various organics, rubber crumb and dissolved coagulation and compounding chemicals.

B. SOURCES OF LIQUID WASTES, TREATMENT AND DISPOSAL

The waste water flows at the Copolymer, Butyl and Latex Units are illustrated in Diagram #13.

As shown on the block diagram, wastewater streams are discharged from the Latex unit in three separate ways. Two of the waste streams discharge from the unit to the township ditch and the third is directed to the Copolymer treatment system.

The east discharge from the Latex Unit to the township ditch contains flows from #2 Latex Plant, the preconcentrator, #3 turbofilm and a portion of the cooling water from the refrigeration area. The flows from the preconcentrator and #3 turbofilm would have contained small amounts of latex at the time of the survey.

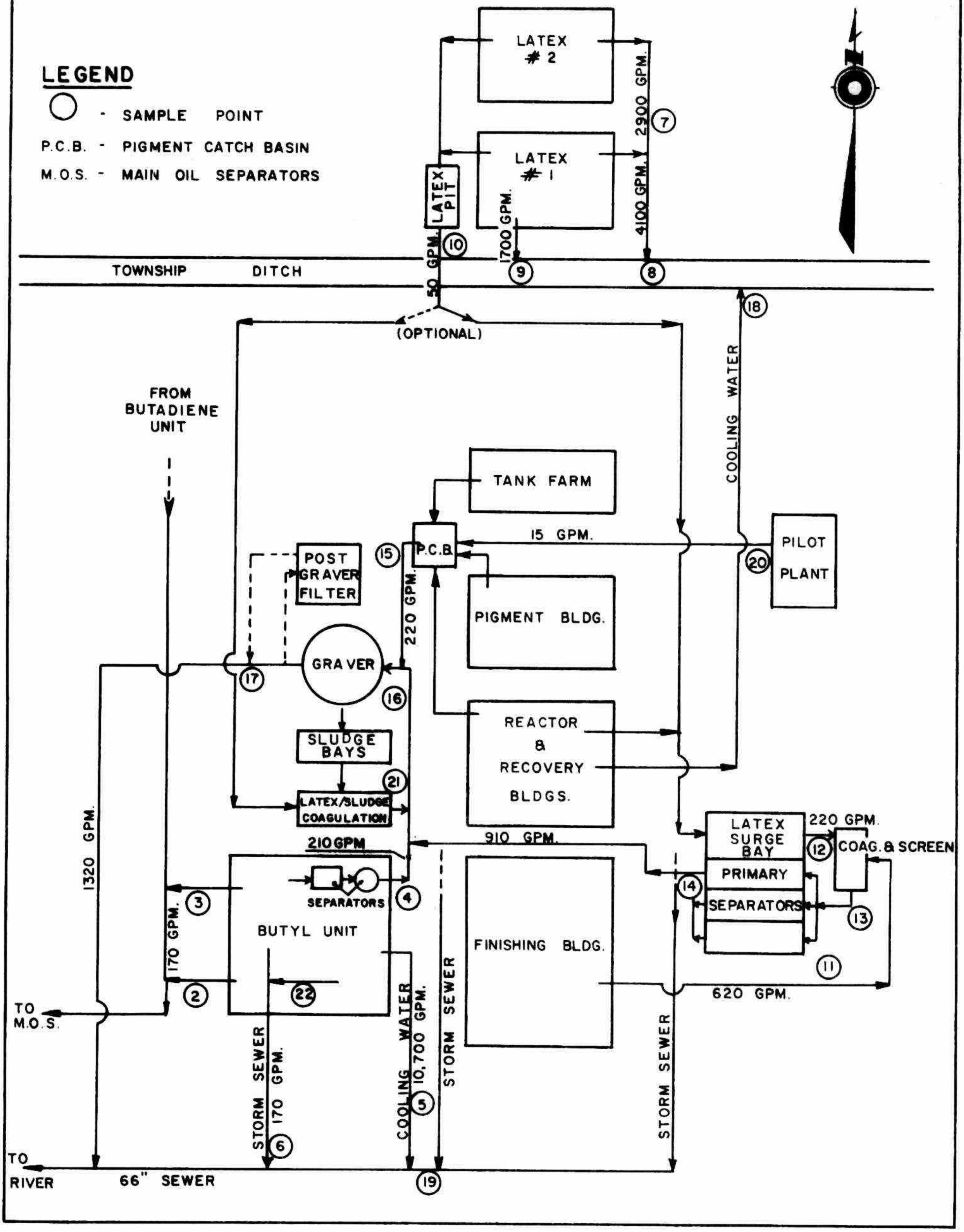
COPOLYMER UNIT WASTE WATER FLOWS DIAGRAM NO.13

LEGEND

○ - SAMPLE POINT

P.C.B. - PIGMENT CATCH BASIN

M.O.S. - MAIN OIL SEPARATORS



As discussed previously, these contact type exchangers have been or are in the process of being replaced by non-contact shell and tube condensers. The contaminated condensate produced from the new system will be discharged to the waste latex pit.

The west discharge from the unit to the township ditch contains water flows from the refrigeration area, #1 turbofilm and #2 turbofilm. These flows should not be contaminated since the condensers have been converted to a non-contact type. The resulting condensate is discharged to the waste latex pit.

The third discharge from the unit contains contaminated wastes from #1 and #2 Latex Plants including reactor cleanings, car washings, miscellaneous floor drains and condensate from the non-contact condensers. These wastes are collected in a pit at the Latex Plant and are pumped to the waste latex surge bay at the Copolymer Unit for treatment.

As shown on diagram #13, process wastes are discharged from the Butyl Unit to the 66" sewer, the Graver and the main oil separator.

Cooling water that does not contact the process is discharged directly to the 66" sewer, and its quality should not be impaired.

A second stream is also directed via a storm sewer to the 66" sewer. The effluent flow contains wastes from the knock-out drums, drier regeneration system and reactor sump area. The untreated flow contains rubber crumb, oily wastes and caustic discharges. It should be noted that the caustic was not being discharged at the time of sampling. During sampling however, the flow contained visible amounts of free oil. The discharges from the knock-out drums and the reactor sump have been directed to the Copolymer Treatment system since the survey was conducted.

Rubber crumb discharges that originate in the dewatering area of the finishing building are directed to the Copolymer Graver. Prior to the Graver, two separators are employed by the Butyl Unit to remove rubber particles. The first separator has a 4,000 gallon capacity and a 0.3 hour retention time, while the second has a capacity of 1,800 gallons. The discharge to the Graver from the separators contains rubber crumb and some dissolved organics.

Oily wastes that originate in the Butyl Unit are discharged via two outfalls to the oily water sewer. The north outfall to the oily sewer contains wastes from the compressor area. The south outfall is comprised of oily wastes from the reactor, catalyst feed and drum rack areas. Both waste streams contain free oil and dissolved hydrocarbon.

All wastes that enter the oily water sewer are treated in the main oil separator. Since this separator is also utilized by other units, the operation will be described in the section entitled "Outfalls".

Wastewaters that originate within the Copolymer Unit are handled by two separate methods. Cooling water and a potentially contaminated flow from the acrylonitrile condensate water stripping column are discharged without further treatment to the Township Ditch. All other wastewaters are treated in the Graver and associated systems.

A contaminated flow from the waste latex pit of the Latex Unit is received at the Copolymer waste latex surge bay along with waste latex and styrene streams from the Copolymer reactor and recovery areas. The Copolymer waste flow consists of waste streams from the styrene removal system, reactor cleaning and various purges within the recovery and blend tank areas.

The waste latex is collected in the surge bay and pumped to a calcium chloride coagulation system. This system is employed to convert the dilute latex into a rubber crumb form that is more readily removed.

The coagulated stream then converges with a large flow from the Copolymer finishing area. The finishing area flow contains wastes from the coagulation tanks, reslurry tanks, extruders, latex line purges and floor washings in the finishing building. This flow contains rubber crumb, carbon black, and dissolved coagulation chemicals.

The combined streams from the finishing area and the waste latex coagulation system are passed over two vibrating screens in parallel to remove large rubber particles. The rubber recovered is removed for disposal at the Company dump site and the aqueous portion is discharged to the primary separators.

The primary separators consist of three bays operating in parallel with a total volume of 157,000 gallons and an approximate residence time of 3.0 hours. Each bay is cleaned individually once per week by clamming and once per month by pumping out accumulated sludge. At the time of the survey only two bays were operative due to cleaning.

The discharge stream from the separators is directed to the Graver clarifier. Prior to the clarifier, however, streams from the Butyl Unit, the Latex-Sludge Disposal system and the pigment catch basin (P.C.B.) enter the flow for treatment at the Graver.

The pigment catch basin flow contains wastes from the tank farm, pigment buildings, reactor buildings and the pilot plant. These waste flows originate from floor and reactor washings, pump drips and purges as well as various small flows from research programs being conducted in the pilot plant. The catch basin could contain monomers, soaps, oils and other chemical wastes.

The total combined flow prior to entering the Graver is initially treated with lime, alum, and a flocculent aid. This treated stream enters the centre of the Graver through a draft tube. After contact with recirculating sludge, the stream passes over the top of the tube and into the encircling cone. Theoretically, the floc should form in this cone. The flow passes down through the cone and up into the settling area of the Graver where it is retained for approximately 2 hours for sedimentation. Sludge is periodically drained off the bottom and discharged to the sludge bay. Treated water is removed at the surface and directed to the 66" sewer. This waste flow contains rubber crumb, phenolic compounds, emulsifiers and dissolved hydrocarbons.

Since this discharge has, in the past, been continually above Ministry objectives for suspended solids, a dual media, six-cell filter was being constructed during the survey to further treat the Graver effluent. Since this system was not operational at the time of the survey, samples could not be taken.

The sludge removed from the Graver and stored in the two holding bays is co-coagulated with waste latex from the Latex Unit. To accomplish this, the waste latex is periodically diverted from the waste latex surge bay to the Latex-Sludge Disposal (LSD) process in order that it can be coagulated with the sludge to form a product that is suitable for land disposal. The crumb formed by the coagulation is dewatered on a vibrating screen and trucked to the disposal area. The liquid portion is re-directed to the Graver.

C. SAMPLE POINTS AND DESCRIPTIONS

1. Service Water

- Copolymer pump house June 21, 27
- Latex Plant June 28
- Butyl Unit July 4, 5

2. Oily Butyl Effluent

   - South discharge to the oily sewer. Obtained by inserting a metal tube down the oily sewer manhole and up the Butyl discharge. A vacuum pump was then employed to pull the sample to the container. This method was used to avoid contamination of the sample by the oily sewer.

3. Oily Butyl Effluent

   - North discharge to the oily sewer in the same manner as 2.

4. Butyl Finishing to Graver

   - Effluent trench from Butyl

5. Butyl Cooling Water

   - manhole (6 + 63S, 11 +68W) at the east of the unit prior to entry into the 66" sewer.

6. Total Butyl Storm Sewer Flow

   - square manhole (12 + 26S, 10 + 7W) situated between the tank farm and process area

7. Latex #2 Effluent

   - manhole (3 + 56N, 3 + 44W) between plants #1 and #2

8. Latex Plant to Township Ditch

   - east discharge to ditch

9. Latex Plant to Township Ditch

   - west discharge to ditch

10. Effluent from Waste Latex Pit - #1 Plant

    - pump discharge in latex pit pump house

11. Copolymer Finishing to Primaries

    - finishing trench prior to screening

12. Waste Latex Influent to Primary Coagulation

    - inlet trench to waste latex surge bay

13. Total Primary Influent

    - influent trench

14. Total Primary Effluent

    - effluent trench

15. Pigment Catch Basin Effluent

    - manhole (2 + 81S, 5 + 75W) west of the P.C.B.

16. Total Graver Influent

    - prepared sample point behind sludge bays

17. Total Graver Effluent

    - Graver discharge box after weir

18. Copolymer Cooling Water to Ditch

    - discharge to ditch

19. Total Copolymer Storm Sewer Flow

    - manhole (12 + 64S, 5 + 63W) at south west corner of the finishing building

20. Pilot Plant to P.C.B.

    - manhole (2 + 33S, 1 _50W) outside of Pilot Plant

21. Latex-Sludge Disposal to Graver

    - down pipe to Graver influent collection pit

22. Butyl Storm Sewer

    - manhole (11 + 76S, 9 + 69W) to obtain flow from reactor and D-10X only.

D. DISCUSSION OF RESULTS

(a) Effectiveness of Treatment Systems

The results of the laboratory analyses on the waste water samples selected from the Copolymer Unit are compiled in Table V.

The waste loadings, as shown in Table VI, indicate that both the waste latex flow from the latex plants (Pt. 10) and the waste latex flow from the Copolymer Unit reactor and recovery areas (Pt. 12) are heavily contaminated. Since samples were not collected within the waste latex coagulation system, the effectiveness of this treatment system cannot be discussed. The concentration of suspended solids, however, in the total primary influent stream (820 ppm) on June 27, 1972 indicates that the dual Sweco screens allow large amounts of crumb to pass through.

By assessing the laboratory results obtained on the influent and effluent samples, as shown in Table V, the effectiveness of the primary separators can be determined. On June 21, 1972, the primary coagulation and Sweco screening systems were not operative and therefore the Copolymer finishing flow must be taken as the primary influent flow. At the time of sampling the primary separator was twenty percent effective in removing the suspended solids from the wastewater stream. On June 27, 1972, the latex coagulation system was operating. The suspended solids results for the influent and effluent streams from the primary separators indicate that, on June 27, approximately eighty five percent of the suspended solids were being removed.

During the June 21, 1972 sampling period the dissolved solids concentration noted in the primary separator effluent stream was significantly higher than on June 27, 1972. It is suspected that a finished line cleaning and subsequent dumping of a serum tank could account for this upward fluctuation. The results in Table VI also indicate that the primary discharge contains the highest loading and concentration of phenols in the unit. The high phenolic content is probably due to the use of phenolic stabilizers in the Copolymer Unit finishing area.

As shown in Table VI, the pigment catch basin is the second largest contributor of contaminants that are discharged to the Graver. It should be pointed out that the average results, as shown in Table VI, include the results obtained on the samples collected on June 21, 1972. On this date, a rosin acid spill increased the concentration of the contaminants significantly above those obtained on the June 27, 1972 sample, and it is suspected, considerably above normal concentrations.

The Pilot Plant effluent was sampled in order to obtain information on the quality of this discharge and its contribution to the pigment catch basin influent. Although the phenol concentrations and threshold odour are high, the stream is considered of minor importance since it contributes only approximately 1% of the total phenolic contaminants discharged to the Graver.

The effluent stream from the Butyl finishing area is directed to the Graver for removal of the suspended solids. Table VI indicated that this stream contributes little to the total loading of the influent stream to the Graver. In the future, the Butyl finishing stream will be met with a rubber bearing stream that is currectly being discharged to the 66" sewer and the combined flow will be forwarded directly to two cells of the post-Graver filter for rubber solids removal.

The influent and effluent results as determined for the Graver indicate that this system is approximately sixty-five percent effective in reducing the suspended solids concentration in the wastewater stream. Since the ether extractables test probably measures a portion of the rubber crumb, the system also appears to reduce the ether extractables concentration.

The Graver was designed to reduce the suspended solids concentration in the wastewater stream from an average of 250 ppm to the Ministry's 15 ppm objective with flows fluctuating from 1.9 to 2.4 mgd. The current flow through the system is 1.9 mgd, however the suspended solids concentrations are only being reduced from 240 ppm to 71 ppm. It appears that suspended solids reductions may be achieved by improving the operation of the Graver.

(b) Battery Limits

As shown in Table VI, the effluent stream from the Graver contains high concentrations of suspended solids, BOD, phenols and ether extractables. The flow is responsible for 1,350 lb./day of suspended solids, 1,860 lb./day of BOD, 4.98 lb./day of phenols and 380 lb./day of ether extractables that are discharged to the 66" sewer.

It is evident in Table VI, that the principle source of suspended solids in the Copolymer Unit is the primary separators. These separators receive most of the solids from the finishing building and smaller amounts from the coagulation of the waste latex in the waste latex surge bay. These solids consist mainly of rubber crumb accompanied with smaller portions of carbon black.

The BOD and COD in the discharge stream of the Graver are exerted by the dissolved organics used in the polymerization process. These organics originate from the primary separators and the pigment catch basin.

The phenol loadings as shown in Table VI originate for the most part from the phenolic stabilizers employed in the Copolymer finishing area. It can also be seen from the results that fluctuations in phenol concentrations throughout the system can occur. On June 21, 1972 a fluctuation in concentration that originated from the finishing area resulted in a net loading of 7.6 lb./day phenolics at the discharge from the Graver.

The reported ether extractables loading is in all probability higher than actually exists as a portion of the rubber crumb may be dissolved and included as ether soluble material.

The discharge from the Graver to the 66" sewer could contain rubber particles, salts and various other dissolved compounds such as stabilizers, monomers and emulsifiers.

The Copolymer Unit also discharges wastewaters to the Township Ditch and via a storm sewer to the 66" sewer. The cooling water flow to the Township Ditch was not contaminated at the time of sampling. The storm sewer that discharges to the 66" sewer also was relatively uncontaminated at the time of sampling except for a high phenol concentration. Subsequent discussions with Polymer personnel on this subject indicate that although the results obtained by Polymer's laboratory on a duplicate sample agree with the Ministry's results, high phenol concentrations are not characteristic of the discharge on a continuing basis. It does indicate, none the less, the possibility of an intermittent and perhaps unknown discharge.

The latex plant discharges wastewaters by two outfalls to the Township Ditch. Both outfalls were relatively uncontaminated at the time of sampling and contribute little in the way of waste loadings.

The Butyl Unit discharges oily wastes to the main oil separator, cooling water to the 66" sewer and other contaminated streams via a storm sewer to the 66" sewer. Since the oily streams enter the River only after treatment by a system external to the Unit (Main Oil Separator), they will be discussed in the section entitled "Outfalls".

As shown on Table V, the cooling water discharged to the 66" sewer was acceptable for discharge to a watercourse for those parameters measured at the time of the sampling.

Table V also indicates that the quality of the wastewaters discharged via the storm sewer to the 66" sewer at sample point 6 was above Ministry objectives for suspended solids. The oily discharge from the knock-out drums and caustic from the alumina regeneration system were not being discharged during the sampling periods. It should be pointed out that the continuous flow from the reactor sump and the intermittent flow from the Knock-out drums are to be removed from this sewer and directed to the Copolymer treatment system. It is expected that the quality of the wastewater flow should improve when these streams are directed to the Graver.

E. CONCLUSIONS AND RECOMMENDATIONS

(a) The Copolymer Unit contributes approximately 1,860 lb./day of BOD, 5,800 lb./day of COD and 1,170 lb./day of TOC to the 66" sewer. It is recommended that Polymer investigate the possibilities of reducing the dissolved organic content in the wastewaters from the Graver that contribute to the BOD, COD and TOC in order to reduce the threshold odour and possible sub-lethal effects on the aquatic communities, including the potential for fish tainting. This recommendation is discussed in more detail in the section entitled "Outfalls".

(b) The Copolymer Unit contributes approximately 4.98 lb./day of phenolic compounds to the 66" sewer. Polymer Corporation Limited should attempt to reduce the quantities discharged, possibly by initiating an investigation to determine whether stabilizers with a lower phenolic content can be used in place of the present stabilizers. Optimization of stabilizer usage and reduction of wastewater flows in the finishing area may also be helpful in this area of wastewater improvement.

(c) Approximately 1,350 lb./day of suspended solids were discharged from the Graver at the time of sampling. To reduce this problem the post-Graver filter was being installed during the time of the survey. It is therefore recommended that this system be evaluated after construction has been completed to determine the characteristics and acceptability of this discharge. It is also recommended that Polymer continue to investigate the possibility of in-plant reductions in suspended solids loadings. These in-plant steps could include the improvement of the Sweco screening operation at the waste latex coagulation system, finishing area wastewater reductions and continued improvement and maintenance of the Graver operations.

(d) The Copolymer Unit and more specifically the Copolymer finishing area discharges approximately 98,000 lb./day of dissolved solids to the 66" sewer and is thereby the largest contributor of dissolved solids in the complex. It is recommended that the Copolymer Unit adopt a policy whereby the amount of dissolved solids discharged are kept to a minimum. This policy should attempt to optimize brine usage and eliminate or minimize dumping of serum tanks.

(e) The concentration of suspended solids in the storm sewer from the Butyl Unit was above Ministry objectives for discharge at the time of sampling. Since the time of the survey, however, steps have been taken to remove the flows that contribute the majority of the contamination. The storm sewer should be resampled in the future to determine the acceptability of this discharge and in particular to review the problems involved with the intermittent caustic discharge from the drier regenerators. At this time, recommendations as to the need for treatment of this discharge can be made.

(f) The phenol concentration in the Copolymer storm sewer can periodically fluctuate to levels as high as 200 ppb. It is recommended that Polymer investigate this problem with the aim of the investigation being the identification of the contributory waste stream or streams and the development of alternate disposal methods.

BUTADIENE UNIT

The Butadiene Unit produces butadiene in a dehydrogenation process using an n-butylene feedstock from the Feed Preparation Unit of the Polymer complex. The Butadiene Unit consists of the Dehydrogenation A, Dehydrogenation B and the Butadiene #1 areas that have been in operation since 1943. The unit also includes the Butadiene #2 area which was added in 1962.

The total annual production currently amounts to 188 mm lbs. of 95% butadiene from Butadiene #1 and 100 mm lbs. of 99% butadiene from Butadiene #2.

A. PROCESS

I Dehydrogeneration

(a) Raw Materials

- quench oil
- n-butylene feedstock
- tertiary butyl catechol
- sodium hydroxide
- sodium hypochlorite
- polyelectrolyte
- Ca, Ni catalyst

(b) Process Description (Diagram 14)

The dehydrogenation process at the Butadiene Unit takes place in the Dehydro A and Dehydro B areas. Since the processes of each area are identical, the following description will cover one area only, to avoid duplication of information.

REPORT ON FIELD INVESTIGATIONS

DATE OF EXAMINATION - May to Sept., 1972 PLACE - Sarnia

MATTER INVESTIGATED - Polymer Corporation Ltd.

AT REQUEST OF - R. M. Gotts

INSPECTION MADE IN COMPANY WITH - P. Litrenta, J.D. Luyt

OTHER PARTIES SEEN - I.W.E. Harris, H. Minnis

REPORT TO BE SENT TO -

I.C. Rush
President (to receive 1 copy)
Polysar Ltd.
Sarnia, Ont.

D.J. Wormith
Manager, Sarnia Manufacturing
Polysar Ltd. (to receive 5 copies)
Sannia, Ont.
Attn: I.W.E. Harris

Messrs.
K.H. Sharpe
D.P. Caplice
E.W.C. Turner
F.R. Phoenix ✓
J.D. Luyt
G.A. Grosse

R.A. Abbott
Sarnia Sub-office
London Office
Central Records
Library
J.R. Barr, Director
Sanitary Engineering Branch
R.M. Gotts, Supervisor
Waste Management Branch
J. Petchison, Regional Engineer
Wastes Management Branch
C.F. Schenk, Supervisor
Biology Section
Water Quality Branch
F.N. Durham, Regional Engineer
Air Management Branch
Attn: I. Robertson

OTHER RECOMMENDATIONS TO THE OFFICE RE PROCEDURE TO FOLLOW -

REPORT BY R.A. Breeze

NOTE: This completed form to be attached to each report

An n-butylene liquid feedstock, received from the Feed Preparation Unit, is initially heated in a gas fired furnace to attain reaction temperature. The heated gaseous stream is then met with a stream of superheated steam and is directed to the reactor system.

The reactor system utilizes two alternately operating reactors. This cyclic arrangement allows one reactor to operate while the other is regenerating.

The reaction takes place at temperature of 1200° F over a calcium-nickel catalyst and results in a product composition of 50% n-butylene and 33% butadiene. Due to the high reaction temperature, the product must be cooled before further processing can take place.

The first step in the cooling process takes place in the waste heat boiler. At this point, a condensate stream from BE #2 and the Steam and Power Plant is added to the hydrocarbon. The hydrocarbon is rapidly cooled and the condensate which is converted to steam is recycled to the furnaces.

The hydrocarbon is further cooled by the use of a quench oil. After contact the oil exits from the bottom to be recycled and the hydrocarbon proceeds over the top of the column to a set of four condensers where water is condensed.

The hydrocarbon in the condensers then enters a water quench tower where the gaseous hydrocarbon is cooled to its final temperature by a water stream. The aqueous effluent from this tower is stripped along with the water from the condensers before it is discharged to the Wemco Depurator. The hydrocarbon recovered from the stripping system joins the reactor product stream.

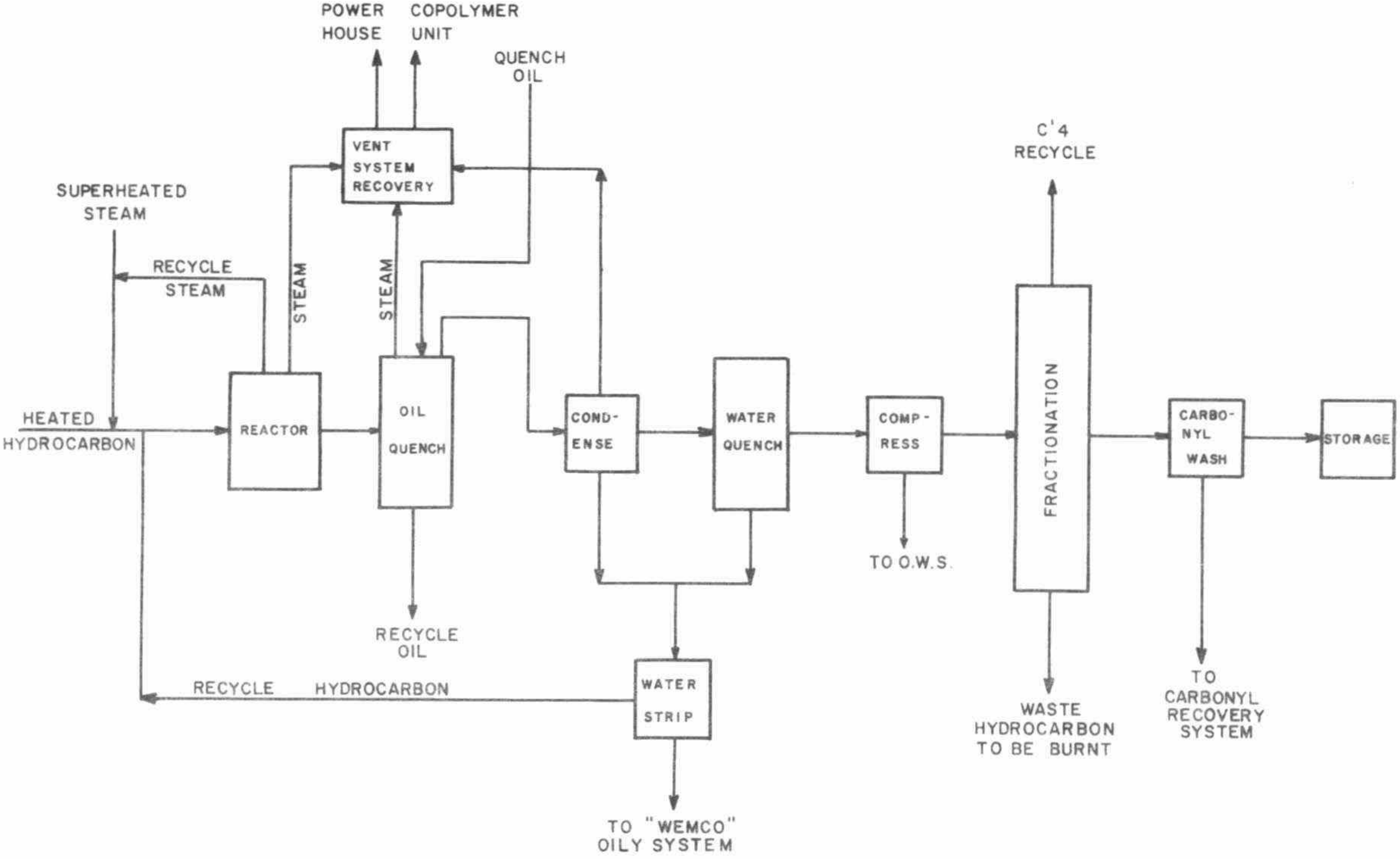
The gaseous hydrocarbon which exits from the water quench tower is directed to a series of compressors where it is liquified in preparation for fractionation. The fractionation system initially employs a stabilizer to remove all light gases. These light gases are also fractionated to remove C_4 material which is recycled. The remaining light gases are consumed in the unit furnaces.

After the stabilizer, the liquid hydrocarbon stream proceeds to another fractionating column where C_5 and heavier material is removed. The heavies are stripped of light material before they are forwarded to the Steam and Power Plant for burning.

The fractionated hydrocarbon stream is then water washed to remove carbonyls. The resultant carbonyl contaminated water is discharged to the carbonyl recovery system and the hydrocarbon stream proceeds to a sphere

DEHYDROGENATION PROCESS

DIAGRAM NO. 14



where it is stored.

Since the time of the survey, a new system has been added to the dehydrogenation area. This system was installed to remove undesirable acetylenes from the product. The removal of these contaminants is necessary since a buildup of acetylenes in BE #1 can create an explosive condition.

The new acetylene removal system employs a confidential hydrogenation process to convert the acetylene to more saturated and less harmful components.

Prior to this hydrogenation reaction a water knock-out section is employed to remove water that can act as a poison to the catalyst. The water from this section is periodically discharged to the oily water sewer.

After acetylene removal the hydrocarbon is directed to storage.

II Butadiene Extraction #1

(a) Raw Materials

hydrocarbon feedstock from dehydro
ammonia
copper shot
acetic acid
recycle hydrocarbon from Copolymer
activated carbon

(b) Process Description (Diagram 15)

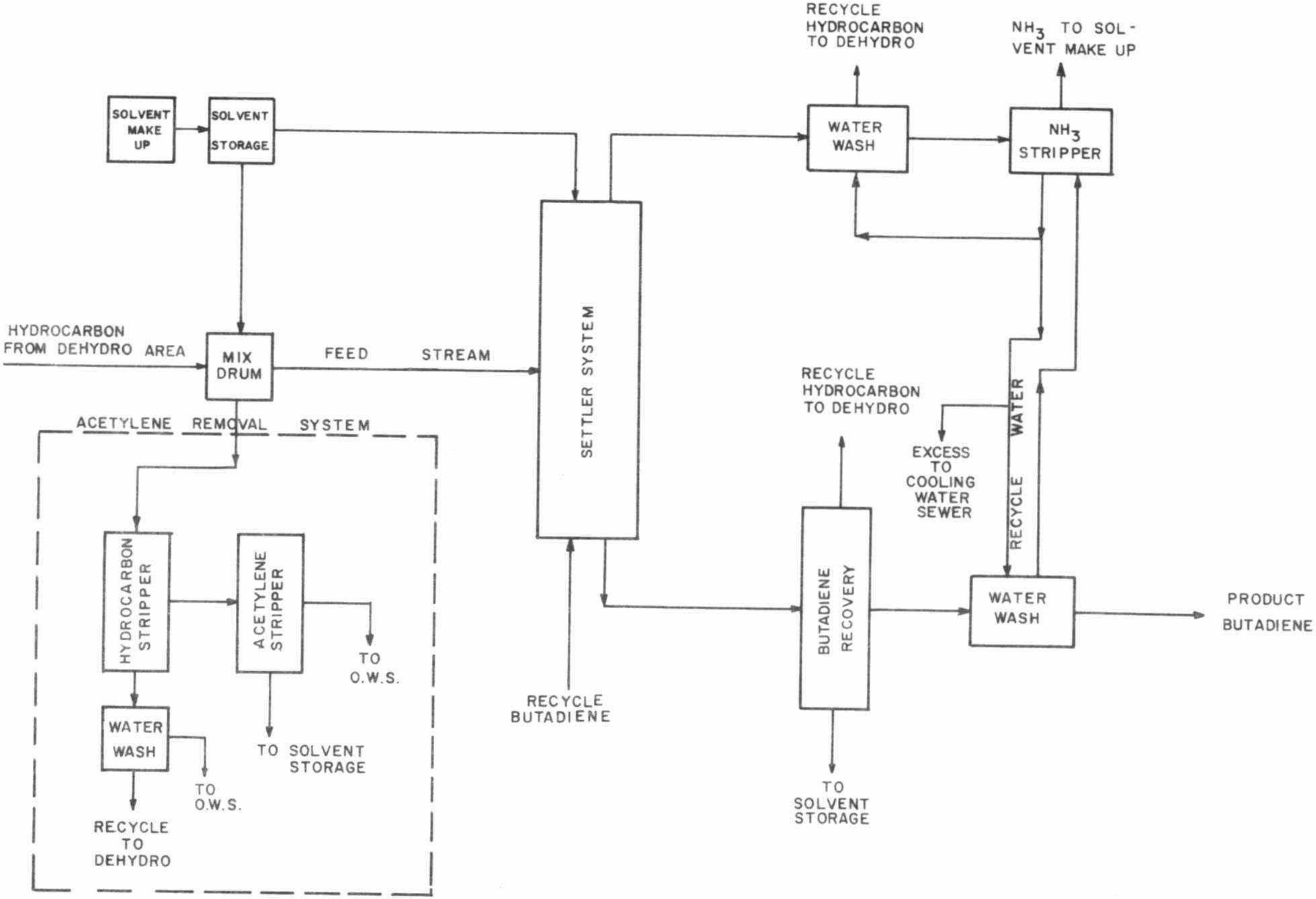
Prior to the installation of the acetylene removal system at the Dehydrogenation area, acetylenes were removed in Butadiene #1. Since the old acetylene removal system was operational at the time of the survey, the process description will be included.

Hydrocarbon from the Dehydro area is initially met with a slip stream of cuprous ammonium acetate solvent. The combined stream enters a mixing drum where acetylenes are extracted from the hydrocarbon by the solvent. The solvent is then directed to the acetylene removal system. This system consists of a hydrocarbon stripping column where hydrocarbon is removed for recycle and an acetylene stripping column where acetylenes are removed and discharged. The remaining solvent is charcoal filtered and recycled.

Butadiene and n-butylene from the mixing drum or, in the case of the new system from the Dehydro storage spheres are directed to the centre of eleven countercurrent extractors and settlers that are arranged in series. The cuprous ammonium acetate solvent enters at one end of the series, a recycled hydrocarbon stream from the Copolymer area enters from the opposite end, and the feed from Dehydro enters from the centre. During the residence time

BUTADIENE EXTRACTION #1 PROCESS

DIAGRAM NO. 15



in the system, the solvent extracts the butadiene from the hydrocarbon mixture.

The solvent which is now rich in butadiene exits from the opposite end of the settler system that it entered and is directed to a butadiene recovery tower. This tower drives the butadiene overhead to a water wash system and discharges the solvent to storage. The water washed butadiene is compressed, rerun and directed to product storage.

The hydrocarbon phase which exits from the other end of the settler system is initially passed through a water wash system to remove any absorbed ammonia. The washed hydrocarbon is then directed to the Dehydro area for recycle. The aqueous portion from the wash system is forwarded to a steam stripper where the ammonia is recovered for recycle in the solvent make-up area. The ammonia - free water from the stripper is sewered. Make up water for the water wash system in the area is received from the Dehydro area.

The cuprous ammonium acetate solvent employed in this process is made up batch wise by adding copper shot, acetic acid and ammonia to a make-up tank.

III Butadiene Extraction #2

(a) Raw Materials

hydrocarbon feedstock from Dehydro
acetonitrile - acetone solvent
sodium hydroxide

(b) Process (Diagram 16)

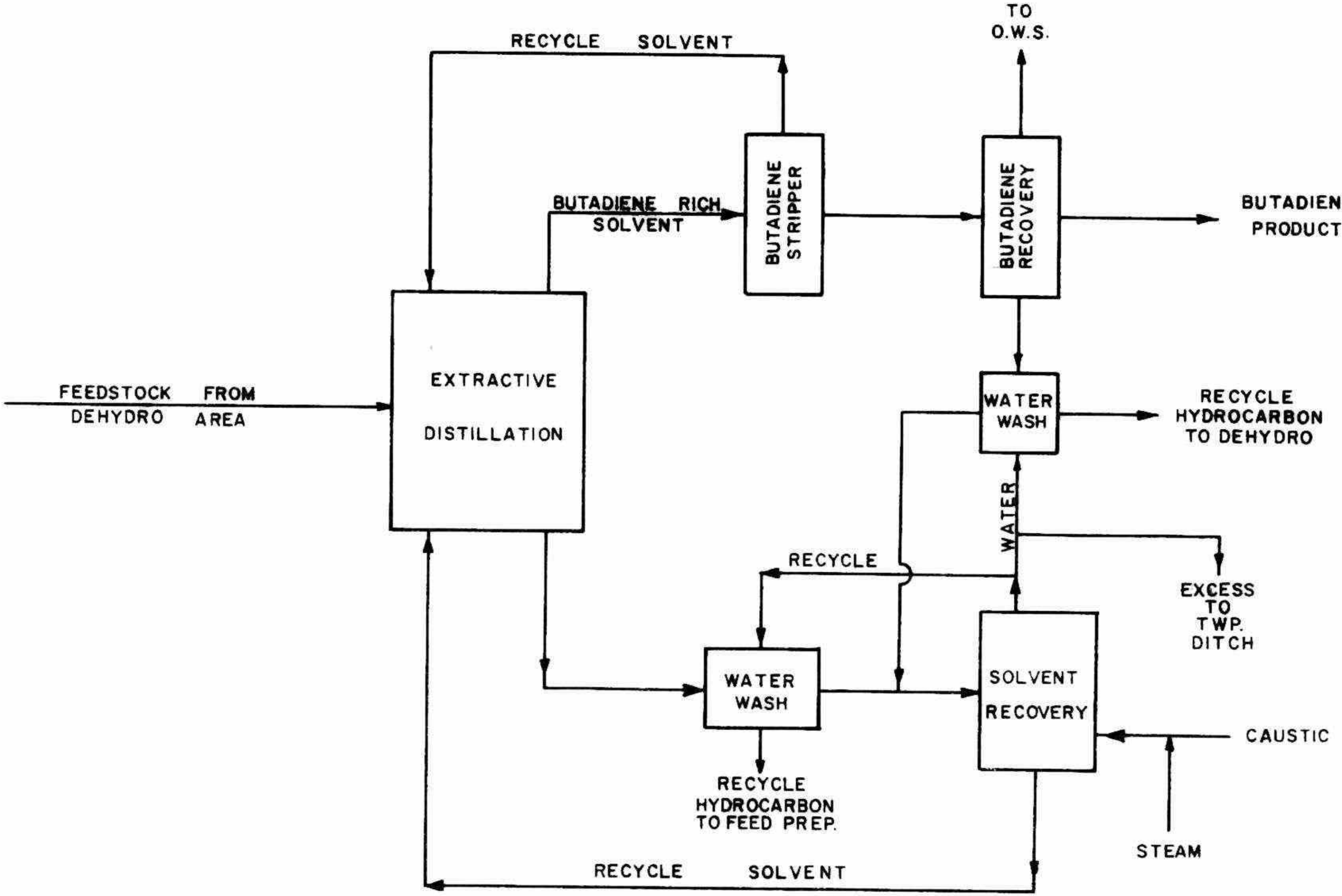
Prior to the installation of the new acetylene removal system at Dehydro, acetylenes were not removed from the hydrocarbon if the feed was to be directed to BE #2. However, since the installation of the new system BE #2 also receives lower acetylene feed from the Dehydro spheres.

The hydrocarbon feed from the Dehydro area is initially mixed with an acetonitrile-acetone solvent. This solvent is employed to preferentially extract butadiene from the main hydrocarbon stream. The butadiene/solvent mixture which is extracted and distilled out in the columns is directed to a stripper where the bulk of the solvent is removed and recycled directly to the extractive distillation system. The butadiene and a small portion of remaining solvent are directed to the butadiene recovery system. At this point, steam is added to a column to remove the butadiene. The 99% butadiene from this recovery system is then forwarded to product storage and the condensate is discharged to the Township Ditch. The remaining solvent and hydrocarbon is water washed and the hydrocarbon portion is forwarded to the Dehydro area. The solvent and water is directed to the solvent recovery system.

The n-butylenes and other hydrocarbons not removed in the extractive distillation are sent to a water wash system.

BUTADIENE EXTRACTION # 2 PROCESS

DIAGRAM NO. 16



This washed hydrocarbon stream is then transferred to the Feed Preparation Unit.

The solvent contaminated water from both of the wash systems in the Butadiene #2 area is directed to the solvent recovery column. Steam is added to the column to drive the solvent overhead for recycle. The water is returned to the water wash systems and any excess is discharged to the township ditch. Caustic is also added to the solvent recovery column on a batch basis as required to maintain a high pH and thereby retard corrosion.

B. SOURCES OF LIQUID WASTES, TREATMENT AND DISPOSAL

As can be seen in Diagram 17, liquid wastes from the Butadiene Unit can be categorized into the three following classifications.

1. Wastes to the Wemco Depurator treatment system
2. Wastes to the Main Oil Separator treatment system
3. Cooling water

Oily wastes that are treated by the Wemco Depurator and subsequently by the phenol removal system originate from the water stripping towers that are situated in the quench sections of each of the Dehydro areas. Aqueous effluent from the two towers is forwarded to individual separation drums where a portion of the free oil is removed. These drums have a 34,000 gallon capacity and an average retention time of 1.4 hours. The oil phase from the two drums is returned to the process for recycle and the water portion is directed to the Wemco Depurator.

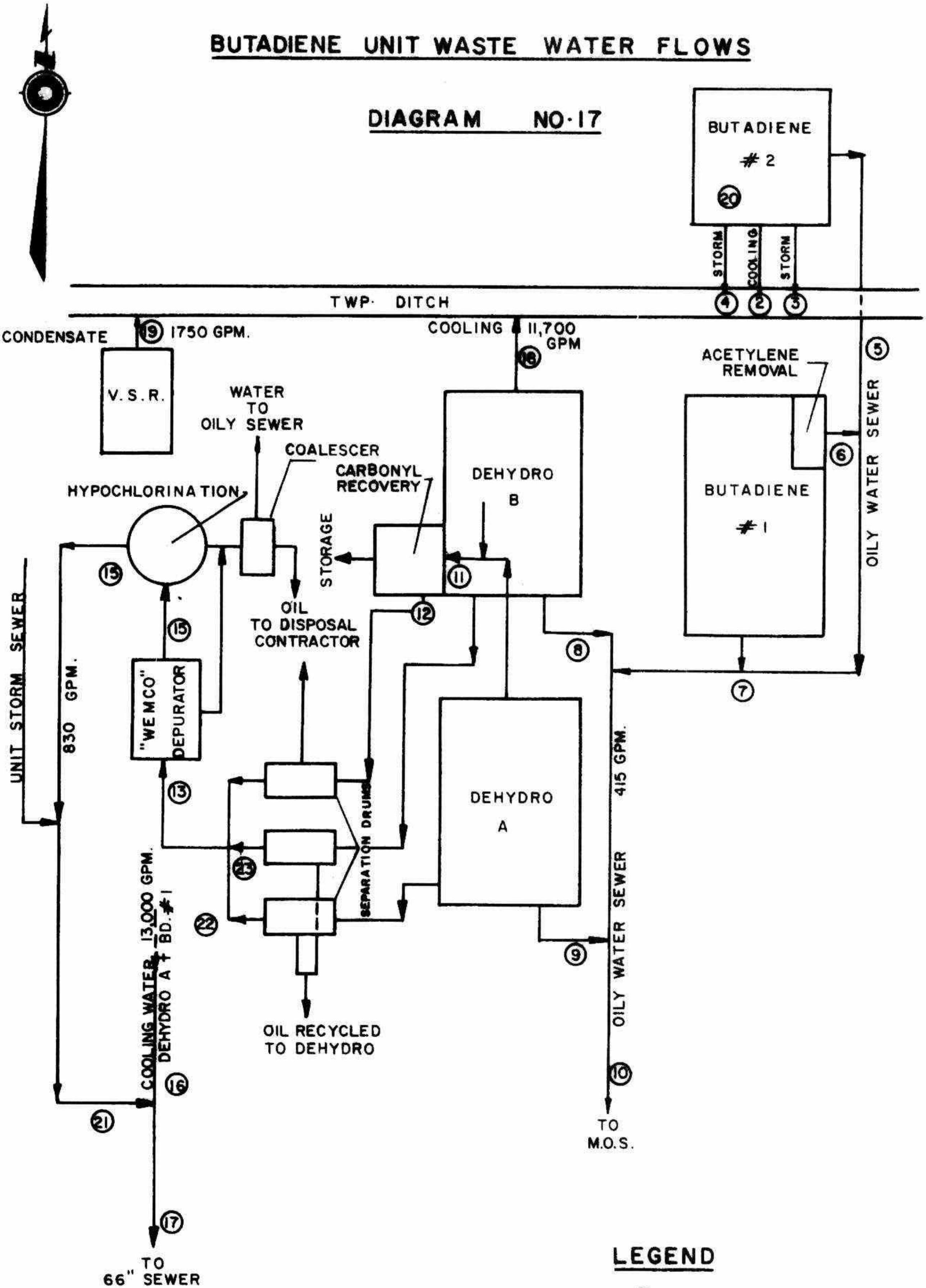
A third stream, from the carbonyl recovery system, is also treated at the Wemco. The carbonyl recovery system treats aqueous wastes from the carbonyl removal areas of both Dehydro A and B. This recovery step is required since carbonyl compounds can emulsify any free oil that may be present in the waste water, thereby inhibiting its removal.

After the carbonyl compounds have been steam stripped from the water and placed in storage, the aqueous portion is directed to a separation drum with an 8,700 gallon capacity and an approximate 0.5 hour retention time. The oily wastes from the drum are collected by a contractor for disposal and the water phase is directed to the Wemco.

The Wemco Depurator is designed to remove free oil from the waste water stream by utilizing an air flotation process. This process requires the use of rotor/dispersors that force waste water out through the dispersor openings thereby pulling air down through a standpipe. The fine dispersion of air created by this action floats to the surface of the water carrying free oil. The resulting surface foam is skimmed from the liquid into collection troughs. The above process is performed in four separate chambers that are arranged in series.

BUTADIENE UNIT WASTE WATER FLOWS

DIAGRAM NO·17



LEGEND

○ - SAMPLE POINT

V.S.R - VENT STEAM RECOVERY

Removed oil is directed to the coalescer in order that water can be removed by settling before the oil is recycled. Water from the coalescer is directed to the oily water sewer. At the time of the survey, the coalescer was out of service due to repairs.

Wemco effluent is discharged to the phenol removal system. This system utilizes the oxidation capabilities of 12% sodium hypochlorite to destroy the phenolic compounds. The oxidation process takes place during an approximate 0.5 hours in a 21,000 gallon reaction vessel that is equipped with baffles and an agitator. The discharge from the hypochlorination system is directed to the Dehydro A cooling water sewer. The waste flow contains dissolved hydrocarbon, carbonyl compounds and phenolic compounds.

Oily wastes that enter the main oil separator treatment system originate from several areas within the Butadiene Unit. At the time of the survey these included the acetylene stripper and the water wash system from the old acetylene removal area in BE #1, the Wemco oil coalescer and compressor water from the Dehydro areas. The waste flow also contains oily water that is collected in curbed areas from the various purges and pump drips that occur throughout the unit. After the survey was completed the acetylene stripper and the water wash system waste streams were replaced by the periodic waste flow from the water knock-out system at the new acetylene removal area.

Since the main oil separator treats wastes from other units in the Polymer plant as well as Butadiene Unit wastes, its operation will be described in the section entitled "Outfalls".

Cooling water is discharged from the Butadiene Unit via the following outfalls.

(a) Butadiene #2 to Township Ditch
(b) Butadiene #1 and Dehydro A to 66" sewer
(c) Dehydro B to Township Ditch
(d) Vent steam recovery to Township Ditch
(steam condensate)

It should be noted, however, that the cooling water flow from the Butadiene #1 area also contains an ammonia contaminated waste flow from the ammonia stripper. All other cooling water streams do not contact materials in the process and therefore should not contain contaminants.

During the survey, it became evident that the west storm sewer that discharges to the Township Ditch from BE #2 was periodically blue in colour. Subsequently it was determined that the waste water flow from the solvent recovery column discharges via this outfall. This flow would contain some dissolved organics.

C. SAMPLE LOCATIONS AND DESCRIPTIONS

1. Service Water

   - influent to G#-4, E9 exchanger

2. Cooling Water From BE #2

   - dual discharge to Township Ditch

3. BE #2 Storm Sewer Discharge

   - east discharge to Township Ditch

4. BE #2 Storm Sewer Discharge

   - west discharge to Township Ditch

5. BE #2 Oily Water Discharge

   - manhole (1 + 08S, 6 + 69W) at the NE corner of the BE #1 area

6. BE #1 Oily Water Discharge - North

   - manhole (1 + 08S, 6 + 69W) at the NE corner of the BE #1 area

7. Total BE #1 and BE #2 Oily Water Discharge

   - manhole (4 + 06S, 8 + 94W) at the S end of the BE #1 area

8. Dehydro B Oily Water Discharge

   - manhole (2 + 66S, 10 + 37W) at the SE corner of the Dehydro B area

9. Dehydro A Oily Water Discharge

   - manhole (5 + 88S, 10 + 37W) at the SE corner of the Dehydro A area

10. Total Butadiene Unit Oily Water Discharge

    - manhole (7 + 25S, 10 + 37W) at the SE corner of Butadiene Unit. This flow is directed to the main oil separator.

11. Influent to Carbonyl Stripping Column

    - valve sample point on inlet line

12. Effluent from Carbonyl Stripping Column

    - valve sample point on discharge line

13. Wemco Influent

    - valve sample point on inlet line

14. Wemco Effluent - Phenol Removal Influent

    - valve sample point on Wemco discharge line

15. Phenol Removal Sysytem Effluent

    - prepared sample point on discharge line

16. BE #1 and Dehydro A Cooling Water

    - manhole (7 + 09S, 13 + 31W) prior to discharge to the 66" sewer

17. Total Flow to 66: Sewer

    - manhole (7 + 09S, 13 + 31W) prior to discharge to the 66" sewer. This sample included cooling water, storm water and Wemco discharge.

18. Dehydro B Cooling Water

    - discharge to Township Ditch

19. Vent Steam Recovery Discharge

    - discharge to Township Ditch

20. BE #2 Solvent Recovery Column

    - discharge to storm sewer

21. Wemco and Storm Sewer Discharge

- manhole (7 + 06S, 13 + 56W) prior to mixing with cooling water

22. Dehydro A Oil Separation Drum

- prepared sample point on tank discharge

23. Dehydro B Oil Separation Drum

- prepared sample point on tank discharge

D. DISCUSSION OF RESULTS

(a) Effectiveness of Treatment Systems

The results of the laboratory analyses on the samples collected at the Butadiene Unit are displayed in Table VII. The calculated waste loadings are shown in Table VIII.

It can be seen in Table VIII, that the sum of the loadings for the effluent streams of the Dehydro A and Dehydro B separation drums are greater than the loadings for the influent streams to the Wemco. This imbalance may be due to the less acceptable grab method of sampling employed at the separation drums and/or possible phasing of the oily material in the stream, resulting in a less representative sample. The carbonyl stripping column separation drum was not sampled since a sample point was not available. The effluent loadings for the stripping column prior to the drum indicate that this stream does not contribute as high an organic loading to the Wemco as the Dehydro separation drums.

The results in Table VII indicate that the carbonyl stripping column removed eighty-five percent of the BOD, eighty-eight percent of the COD and ninety-five percent of the TOC as well as a large portion of the odour. Presumably this reduction in organics is due to the removal of carbonyl compounds.

The influent and effluent results for the Wemco Depurator in Table VII denote that approximately 90% of the ether extractables have been removed from the waste stream. Utilizing the effluent results from the phenol removal system along with the influent results for the Wemco, it can be seen that approximately eighty percent of the ether extractables have been removed. However, the discharge from the phenol removal system is above the Ministry's objective for wastewaters discharging to a watercourse and results in about 250 lb./day of oil being discharged to the 66" sewer. The Polymer monitoring program, on the other hand, indicates that the ether extractables loading in the effluent stream from the phenol removal system average 674 lb./day and fluctuate from low loadings of 102.8 lb./day to high loadings of 25,000 lb./day. The average loading obtained by Polymer exceeds the design and acceptable value of 360 lb./day.

It should be noted that discrepancies between the ether extractable results as determined on duplicate samples by Polymer (39 ppm) and the Ministry's laboratory (16 ppm) exist.

The effluent results for the Wemco and the effluent results for the phenol removal system, as shown in Table VII, indicate that the phenol removal system reduces the phenol concentration by approximately ninety-five percent. Based on the results obtained during the survey the phenol removal system discharges a waste stream with a phenol concentration of 462 ppb and a waste loading of 5.5 lb./day.

According to the monitoring program performed by Polymer, the phenol loadings at the phenol removal system effluent stream can fluctuate from 10.7 lb./day to 108 lb./day and average 49.6 lb./day. This average value exceeds the maximum loading predicted by Polymer (12.0 lb./day) for this effluent stream. As noted for ether extractables, a discrepancy exists between the phenol results obtained by the Ministry (600 ppb) and Polymer (6000 ppb) on duplicate samples collected during the survey.

By examining the results as shown in Table VIII, the relative contributions of the various areas within the unit to the main oil separator can be assessed. It can be observed that the calculated loadings for the total butadiene oily flow obtained by summing the contributing streams are lower than the loadings obtained directly from the laboratory results on the samples collected from the combined oily butadiene flow. The results do indicate that the oily flows from Dehydro A and B are the largest contributors to the loadings in the sewer.

From Table VIII, it is evident that the origin of the phenol loading cannot be defined. Because of the poor location, samples selected from the Dehydro A sample point could have included wastes from upstream discharges to the sewer. If this is the case, a stream containing high concentrations of phenols may be discharging to the oily sewer between the total BE #1 sample point and the Dehydro A sample point resulting in the high phenol concentration at the Dehydro A sample point. Alternately a waste with high phenol concentrations discharging from Dehydro A may be diluted by upstream wastes prior to sampling.

The results in Table VII indicate a significant increase in oil loading in the total butadiene oily discharge on July 19, 1972. This increase was caused by a slug of quench oil discharged from Dehydro A as the unit shut down for a turnaround. It can be seen therefore that the waste quality can fluctuate considerably during non-routine operations.

It is apparent in Table VIII that although the concentrations of organics for the BE #1 oily discharge (pt. 6) are high, the low flow results in relatively small loadings. It is assumed that the removal of the old Acetylene Removal Unit will have little effect on the loading of the total sewer, except for the concentrations of free ammonia and copper.

(b) Battery Limits

As shown in Table VIII, the Butadiene Unit discharges approximately 3,350 lb./day of BOD, 5,050 lb./day of COD, 2,420 lb./day of TOC and 7.9 lb./day of phenols to the 66" sewer. This discharge stream contains storm water, Dehydro A and Butadiene #1 cooling water, along with the more contaminated flow from the oil and phenol removal system.

Table VIII indicates that the total loadings to the 66" sewer based on the samples collected at Point 17 are less than the loadings calculated for the effluent stream from the phenol and oil removal system. It should be noted that the sample point was situated a few feet downstream of the entrance of the flow from the phenol and oil removal system into the cooling water flow. It was suspected at the time of sampling that adequate mixing of the two flows did not take place and the loadings based on results from the phenol and oil removal effluent stream samples would probably be more realistic.

The majority of phenols, ether extractables, other dissolved organics and odour originate from the water stripping towers that are situated in the water quench sections of the Dehydro A and B areas. As discussed previously these towers are employed to remove hydrocarbon from the effluent streams of the water quench and condensing systems before they are discharged to the separation drums and finally to the Wemco. These streams would contain quench oil along with portions of dissolved hydrocarbon.

As will be discussed more thoroughly in the section dealing with "Outfalls", the dissolved organics discharged from this area have the potential to contribute undesirable odours to both fish and the watercourse.

Wastewaters are also discharged from other sources within the Butadiene Unit. The cooling water flow (Pt. 2) and the east storm sewer flow (Pt. 3) from BE #2, as shown in Table VII, were acceptable for discharge at the time of sampling.

The west storm sewer from BE #2 (Pt. 4) exhibited a high dissolved organic content and was above Ministry objectives for ether extractables at the time of sampling.

Samples collected at the BE #2 solvent recovery column that discharges to this storm sewer also contained organics. It was noted that both samples exhibited a sweet burnt odour. During the July 19, 1972 sampling period, a black oily discharge was evident at the west storm sewer outfall to the Township Ditch. The existence of such a discharge is evidenced by the high ether extractable results shown in Table VIII for that date.

The cooling water and condensate flows from Dehydro B and Vent Steam Recorvery were acceptable for discharge at the time of sampling.

E. CONCLUSIONS AND RECOMMENDATIONS

(a) The Butadiene Unit contributes approximately 3,350 lb./day of BOD, 5,050 lb./day of COD and 2,420 lb. /day of TOC to the 66" sewer. As discussed in the section entitled "Outfalls", this discharge has the potential to contribute undesirable odours to fish and the River. Polymer Corporation Limited should therefore investigate the various methods of treatment that are available for the reduction of dissolved organics in wastewaters. The final aim of this investigation would be employment of the most favourable method of treatment to remove the odour and the potential to taint fish from this waste stream.

(b) The Butadiene Unit discharges approximately 7.9 lb./day of phenols to the 66" sewer. Although the phenol to identify and correct the differences in results.

(g) Because of the discrepancies between the phenol results obtained by the Polymer and Ministry laboratories, it is recommended that a cross check be conducted to identify and correct the reasons for these differences.

FEED PREPARATION UNIT

The Feed Preparation Unit has been operational since 1943, producing an estimated 125 million lb/yr of isobutylene. The unit is comprised of the Isobutylene Extraction and the Butylene Concentration areas.

A. PROCESS

I Isobutylene Extraction

(a) Raw Materials

hydrocarbon feedstock (19-20% isobutylene)
sulphuric acid
sodium hydroxide

(b) Process Description (Diagram 18)

The Isobutylene Extraction area utilizes two individual trains for the extraction of isobutylene from the hydrocarbon feedstock. In order to avoid duplication of information, only one train will be described.

The 20% isobutylene feedstock that is received from local refineries and other sources is initially directed to the reactor section. This section utilizes two reactor/settler systems in series and a countercurrent flow of sulphuric acid to convert the isobutylene in the feed stream to tertiary butyl alcohol in order that it can be removed by settling.

The remaining hydrocarbon, after the reaction has taken place, is removed from the second reactor/settler system. This stream is water and caustic washed before being sent to the Butylene Concentration area.

Acid and tertiary butyl alcohol (T.B.A.) formed during the reaction are removed from the first reactor/settler system and directed to a vent drum. Hydrocarbon from the vent drum is washed and recycled to the area feed stream.

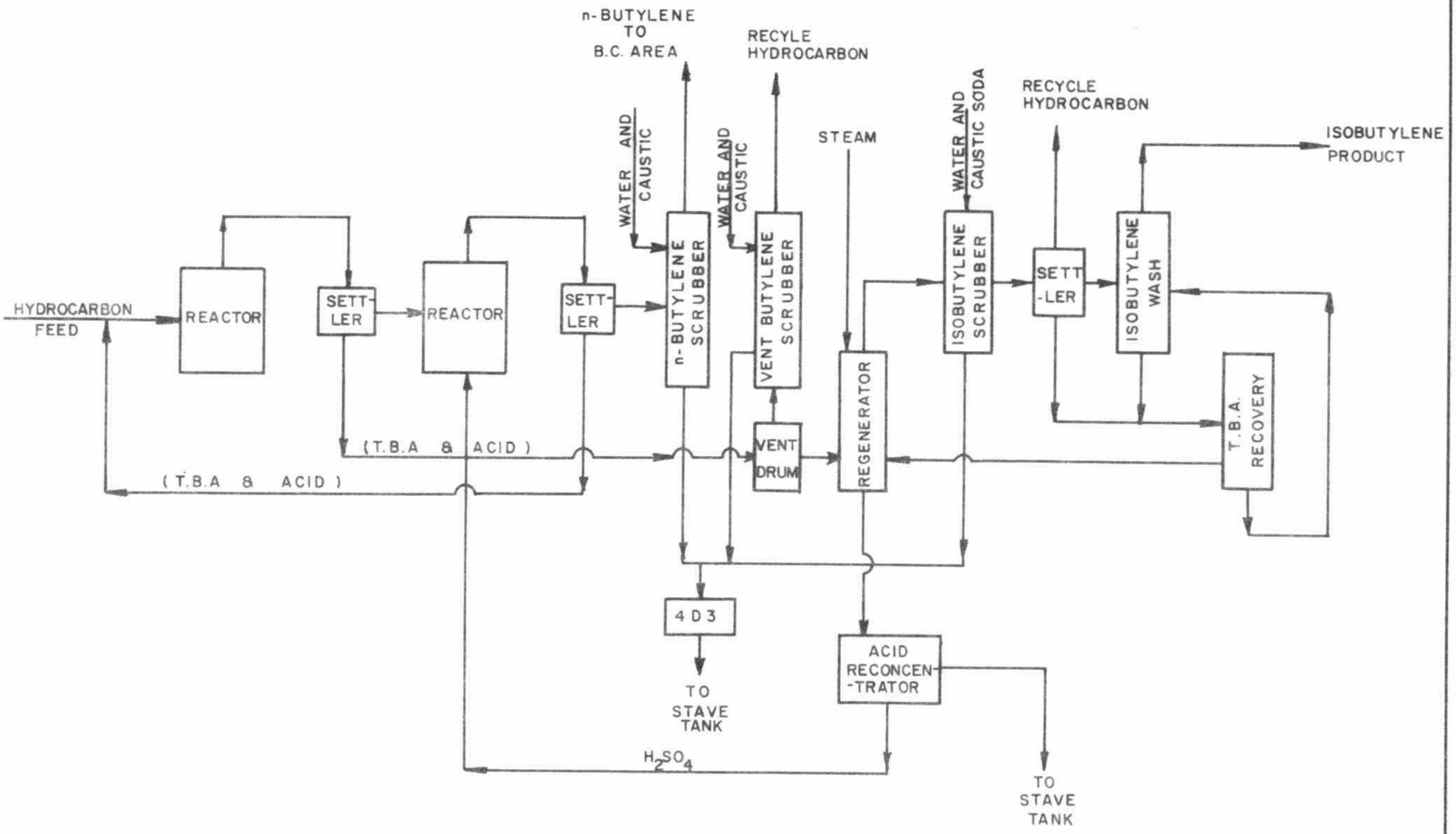
The acid and T.B.A. from the vent drum enter the regeneration system. This system employs steam to reconvert the T.B.A. to isobutylene and drive it overhead. The dilute acid remaining in the regeneration system is concentrated and sent to intermediate storage. Water removed during this reconcentration step is discharged to the stave tank.

Overhead isobutylene from the regeneration step is initially water and caustic washed to remove the gross quantities of remaining T.B.A. The stream then enters a settler where additional T.B.A. is removed. Finally a water wash is employed to remove trace T.B.A. and C_5 plus material before the product is directed to storage. The C_5 plus material is separated in a settler and returned to feed.

T.B.A. and water from the final settler and wash system enters a T.B.A. recovery column. This column employs steam to concentrate and drive the T.B.A. overheat to the regeneration towers. Aqueous effluent from the tower is directed to the isobutylene wash tower for recycle.

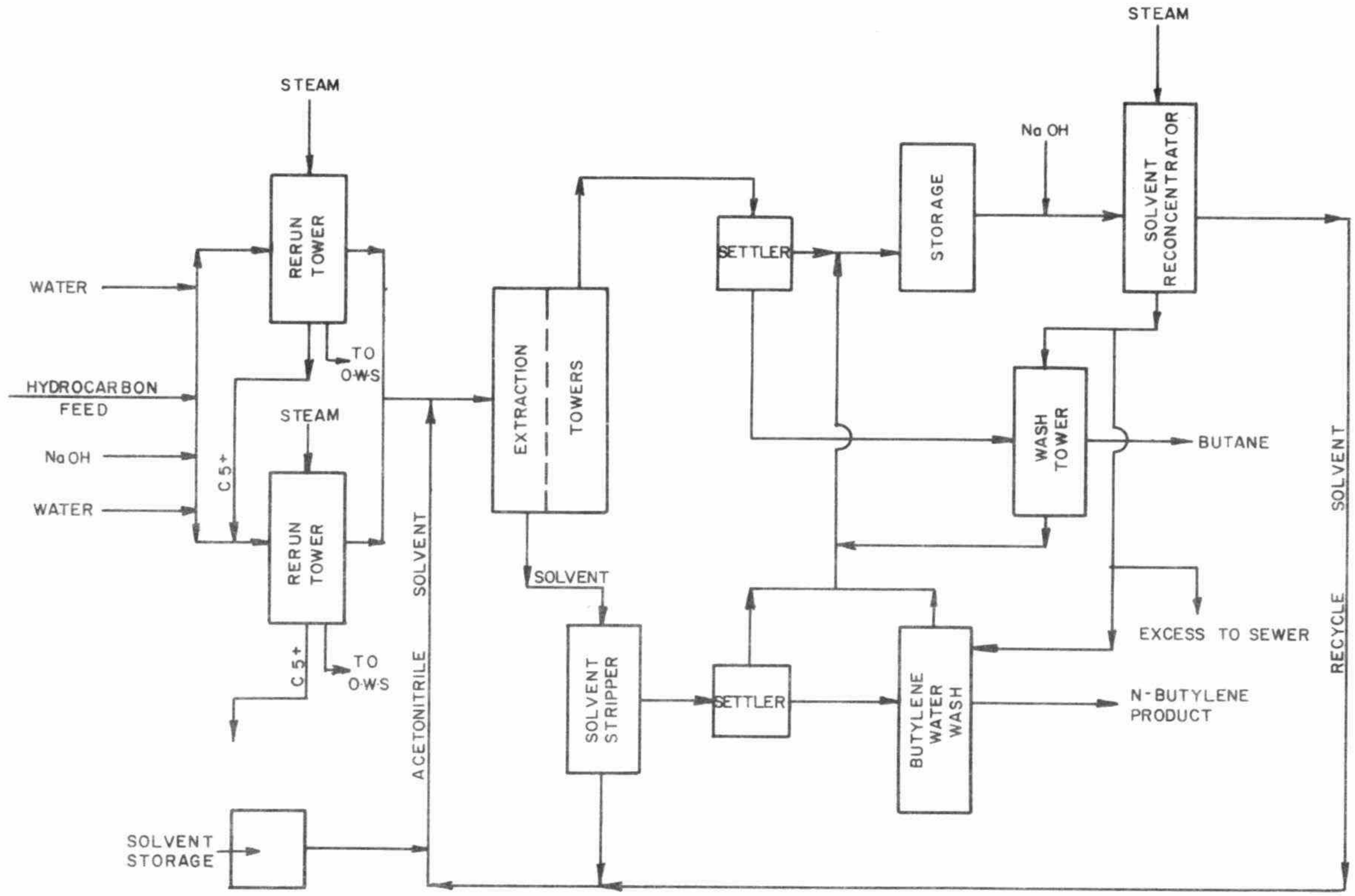
ISOBUTYLENE EXTRACTION PROCESS

DIAGRAM NO. 18



BUTYLENE CONCENTRATION PROCESS

DIAGRAM NO. 19



II Butylene Concentration

(a) Raw Materials

n-butylene
acetonitrile
sodium hydroxide

(b) Process Description (Diagram 19)

A 50% n-butylene feedstock from the Isobutylene Extraction area is initially directed to a pair of parallel rerun towers where residual C_5 and higher material is removed. The heavy material rejected from these columns is sent to local refineries.

The hydrocarbon overhead from the rerun towers is then subjected to an extractive distillation using an acetonitrile solvent. This solvent preferentially extracts the n-butylene from the hydrocarbon mixture.

The n-butylene rich solvent from the columns is transferred to the solvent stripper. This stripper removes the n-butylene from the solvent and directs it to the butylene wash column. Washed butylene is forwarded to storage.

Pure solvent is discharged from the solvent stripper and recycled to the extraction towers. An acetronitrile-rich water solution separates in the reflux drum and is sent to solvent reconcentration via storage.

The overhead stream from the extraction towers, which is butane, is water washed and transferred to local refineries. An acetonitrile-rich water solution separates in the reflux drum and is sent to solvent reconcentration via storage.

As noted, the solvent from the extraction tower settler, solvent stripper, butane wash tower and butylene wash tower is forwarded to the solvent reconcentrator. At this point, steam is added to drive the solvent overhead for recycle. Aqueous effluent from the column is utilized in both the butylene and butane wash towers and any excess is sewered.

B. SOURCES OF LIQUID WASTES, TREATMENT AND DISPOSAL

As shown on Diagram 20, liquid wastes are discharged from the Feed Preparation Unit through:

1. the 54" sewer
2. the wooden stave tank
3. the oily water sewer

Wastes that are discharged directly into the 54" sewer originate from the cooling water system and the overflow from the solvent reconcentrator.

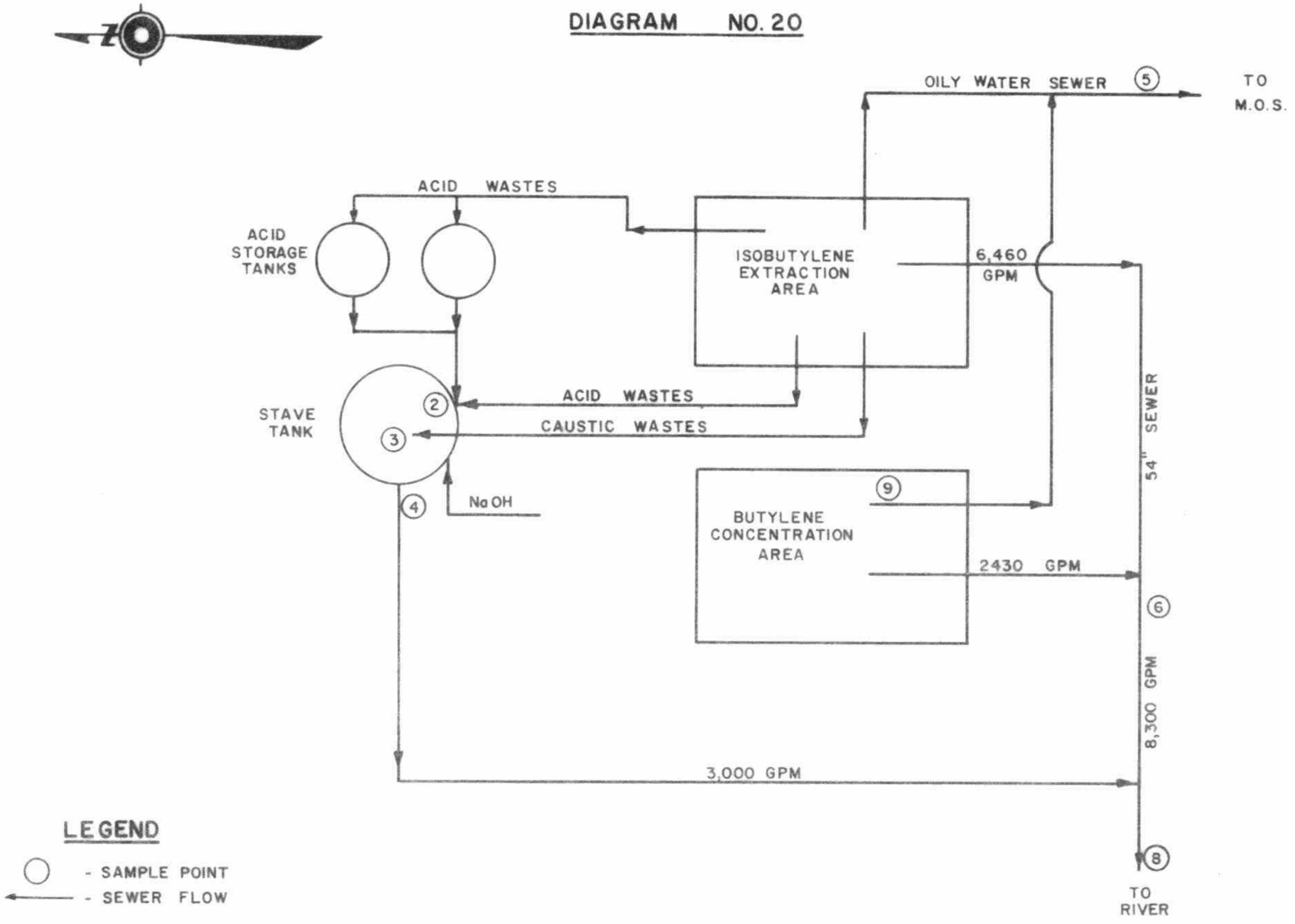
The cooling water flow does not contact the process streams and therefore should not become contaminated.

The overflow from the solvent reconcentrator, however, could periodically contain acetonitrile from the solvent concentrating process.

Most of the contaminated wastes at the Feed Preparation Unit are discharged via the wooden stave tank. These wastes originate from several areas within the unit. Caustic wastes originate from the n-butylene scrubber, vent butylene scrubber, isobutylene scrubber and the T.B.A. recovery tower. Acid wastes originate from the acid reconcentrator, various floor drains within the curbed areas and from equipment maintenance. It should be noted, however, that the wastes that are collected during equipment maintenance

FEED PREPARATION UNIT WASTE WATER FLOWS

DIAGRAM NO. 20



are not discharged directly to the stave tank, but are stored in fiberglass reinforced tanks. The concentrated wastes are then added slowly to the stave tank under controlled conditions.

The stave tank has a capacity of 8,800 gallons to detain and mix the waste effluents in order that the normally low pH can be adjusted to more acceptable levels. This adjustment is accomplished by the addition of caustic to the acid influent stream. A pH probe has been installed to monitor the pH of the effluent and to regulate caustic addition. An automated valve system is also employed in conjunction with the pH monitor to regulate the rate that stored acid is added to the stave tank. Agitation is supplied in the tank by the force of the water entering.

The total flow from the stave tank is pumped to the 54" sewer. This discharge contains dissolved organics such as T.B.A. and acetonitrile and can display low pH values.

Wastes that are discharged from the unit via the oily water sewer originate from the Isobutylene plant compressors and the Butylene Concentration plant rerun towers. Since the total stream is treated for free oil in the main oil separator system, this waste stream will be covered in the section entitled "Outfalls".

It should be noted that after the survey had been completed, the tertiary butyl alcohol recovery tower in the Isobutylene Extraction area was due to be replaced with a larger tower. This step was to be taken in order that the combined flows from the B.C. rerun towers, n-butylene scrubber, vent butylene scrubber and isobutylene scrubber could be accommodated and thereby reduce the T.B.A. level in the discharged caustic streams. As a result of this proposed modification, the flow in the oily water sewer should be substantially reduced.

C. SAMPLE POINTS AND DESCRIPTION

1. Service Water
   - cooling water header within butylene Concentration area
2. Caustic Influent to Stave Tank
   - small volume discharge to stave tank
3. Acid Influent to Stave Tank
   - large volume discharge to centre of stave tank
4. Stave Tank Effluent
   - prepared valved sample point after pump discharge
5. Oily Water Discharge
   - manhole (12 + 34S, 14 + 90W) prior to main oil separator

6. Cooling Water

   - manhole (3 + 20S, 20 + 77W) prior to stave tank effluent flow. Contains cooling water and solvent reconcentrator discharges

8. 54" Discharge to River

   - wooden discharge at river bank. Contains Feed Preparation Unit and Steam and Power Plant Effluent

9. Rerun Tower Bottoms

   Aug. 28/72 - E7A
   Aug. 29/72 - E5A

D. DISCUSSION OF RESULTS

(a) Effectiveness of Treatment Systems

The analytical results, as determined by the Ministry laboratory, and the calculated waste loadings are shown in Tables IX and X.

It is apparent in Table IX that the pH of the effluent stream of the stave tank was below Ministry objectives on August 29, 1972. It is surmised that the low pH was caused by the brownish acid wastes that were discharged from the FRP storage tanks during the time the last two aliquots were taken on that day. These wastes were directed into the acid influent stream to the stave tank. Although this fluctuation is not indicative of normal operations, it does point out the possibility of poor pH control during acid discharges. It is evident on Table IX, that the low pH at the stave tank did not effect the final pH of the composited sample collected at the outfall of the 54" sewer.

However, a pH below Ministry objectives was noted on August 8, 1972 at the outfall, presumably caused by an upset at the stave tank.

Upsets in pH can also create an increase in the dissolved solids content of the stave tank effluent stream. In Table IX, it can be seen that the dissolved solids content increased from 170 ppm to 410 ppm because of the acid discharge.

Oily wastes that originate in the Feed Preparation Unit are discharged via the oily water sewer to the main oil separator. The sample selected at this sewer was not representative since large amounts of oily sediment were stirred up and taken with the sample. Since the rerun tower bottoms contribute about eighty to ninety percent of the flow to the oily sewer, the samples selected from these towers are probably more representative of the oily flow. By assessing the results from the tower bottoms, it appears as though the oily sewer is not a major contributor of contaminants to the main oil separator.

(b) Battery Limits

As shown in Table X, the stave tank discharged approximately 1,530 lb./day of BOD, 24,210 lb./day of COD and 13,370 lb./day of TOC and is thereby the largest contributor of dissolved organics in the Polymer complex. The majority of the organic loadings and possibly the odour causing material originate from the acid influent stream.

At the time of the survey, a tertiary butyl alcohol tower was being installed to reduce the organic contaminants in the wastewater stream from the stave tank. It is expected that this tower will also reduce the odour in this stream that has been attributed in the past to the tertiary butyl alcohol present.

The results in Table IX indicate that the cooling water discharge from the unit is relatively uncontaminated and was acceptable for discharge to a watercourse at the time of the survey.

E. CONCLUSIONS AND RECOMMENDATIONS

(a) The Feed Preparation Unit was discharging approximately 1,530 lb./day of BOD, 24,210 lb./day of COD and 13,370 lb./day of TOC at the time of the survey. To reduce this unacceptable quantity of organics, a new tertiary butyl alcohol tower was being installed at the time of the sampling survey. It is recommended that the stave tank be resampled when the new tower is operational to re-determine the acceptability of this waste stream.

(b) At the time of the survey, two upsets in pH were noted at the stave tank. It is recommended that Polymer continue its investigations to stabilize the pH at the stave tank with the aim to more adequately neutralize the pH during surge conditions.

STEAM AND POWER PLANT

The Steam and Power Plant has been in operation since the 1940's, producing steam and electrical power for the Polymer manufacturing complex. This plant produces approximately 1,400,000 pounds of 400 psig steam per hour.

A. PROCESS

I Steam and Electrial Power

(a) Raw Materials

calcium hydroxide
sodium carbonate
sodium hexa meta phosphate
sodium silicate
sodium sulphite
sulphuric acid
natural gas
fuel oil

(b) Process Description (Diagram #21)

Water received from the pumphouse, is initially directed to two water softeners. These softeners employ lime and soda ash to remove calcium and magnesium salts that would otherwise form scale in the boiler tubes. The insoluble sludge formed in the softeners is withdrawn from the bottom and discharged to a sludge pit. This sludge is removed by tank truck and discarded at the Company dump site. Solids contribution to land burden for the softener sludge amounts to 7,000 to 10,000 lbs./day.

The softened water is forwarded to six steam drum and boiler systems. Prior to entering these systems however, sodium sulphite and sulphuric acid are added. The sodium sulphite is added to scavenge oxygen and thereby retard boiler tube corrosion while the sulphuric acid controls the pH. Sodium hexa meta phosphate is also employed to sequester any remaining calcium and magnesium in the boiler feed water and sodium silicate is used to condition the boiler sludge.

A continuous blowdown (5% of total boiler feed water) is maintained to remove boiler sludge from the steam drum. This blow down stream(50,000 - 60,000 lb./hr. containing approximately 3,000 lb./day gross total solids) is directed to the 54" sewer.

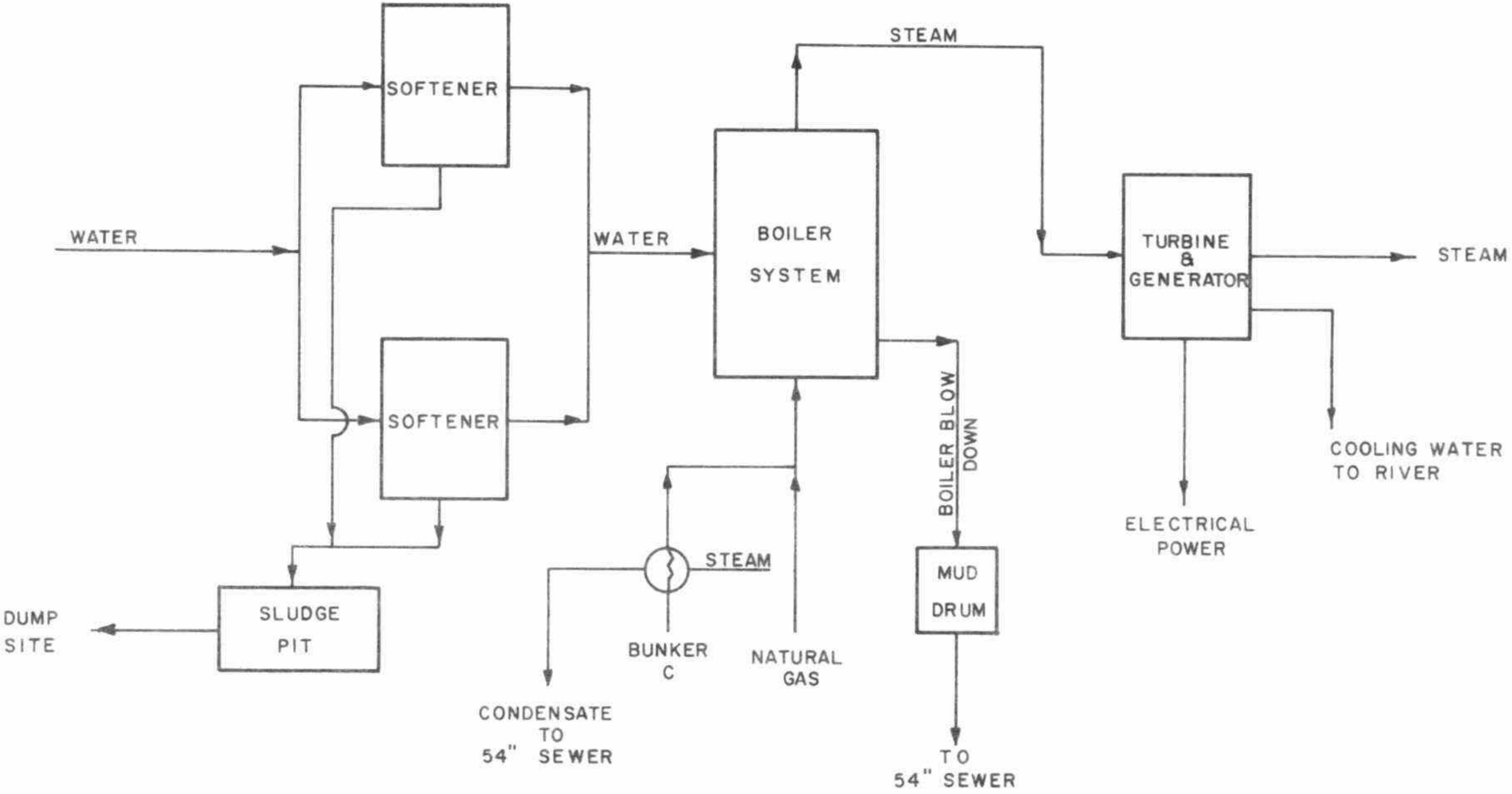
The steam plant employs natural gas fired furnaces to heat the water in the boiler tubes and generate steam. In the winter months, however, some Bunker C fuel is used. This fuel is steam heated in non-contact heat exchangers prior to entering the furnace. The resulting condensate from the heat exchangers is also directed to the 54" sewer.

The steam generated in the boilers is directed to four steam turbines. The turbines employ the steam to drive an equal number of generators and produce the electrical power used in the plant.

Most of the steam exits from the extraction turbines at 165 lb./sq. in. and is directed throughout the Polymer

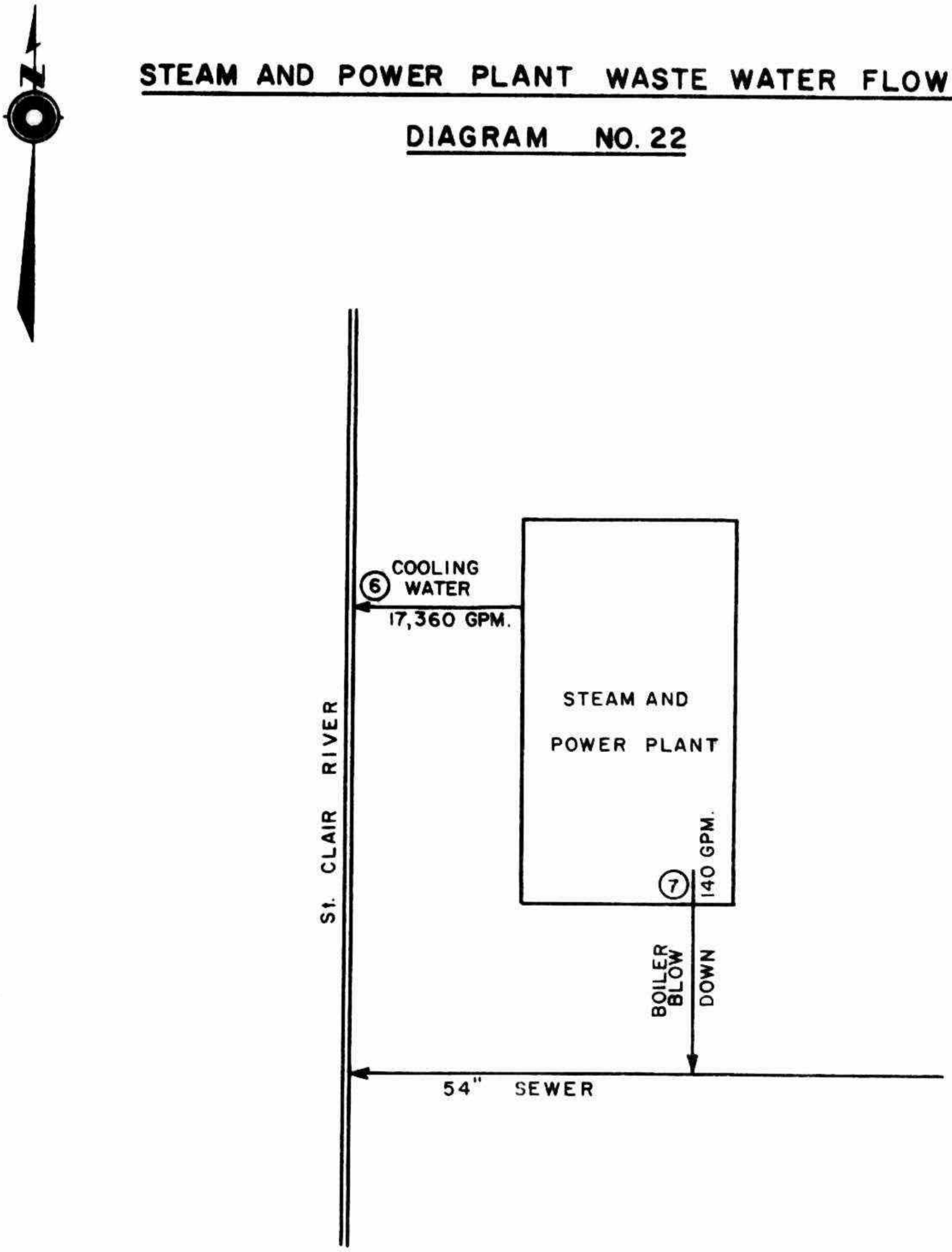
STEAM AND POWER PLANT

DIAGRAM NO. 21



STEAM AND POWER PLANT WASTE WATER FLOWS

DIAGRAM NO. 22



complex for use in the various processes. The remaining steam is directed to condensing turbines where the condensate is either recovered as make up water or is sewered.

B. SOURCES OF LIQUID WASTES, TREATMENT AND DISPOSAL

Wastewaters that are discharged from the Steam and Power Plant fall into the three following categories:

1. Cooling water to St. Clair River
2. Boiler blow down to 54" sewer
3. Condensate to 54" sewer

Cooling water used to condense steam on the condensing turbines is discharged directly to the St. Clair River. This flow should not deteriorate in quality.

Boiler blow down water that originates from the steam drum is discharged directly to the 54" sewer. This stream contains small amounts of boiler sludge and dissolved chemical additives.

Condensate water that is discharged to the 54" sewer from the heat exchanger system utilized in heating the Bunker C fuel is monitored by means of a conductivity probe which is designed to signal and alarm the operators in the event that a leak develops and oil enters the water flow.

C. SAMPLE POINTS AND DESCRIPTION

1. Service Water

   - Feed Preparation Unit

6. Cooling Water to River

   - grabbed at discharge to River

7. Boiler Blow Down

- laboratory sample point. (To obtain one aliquent for the hourly sample, a 5 oz. sample was taken from each of the six boiler blow downs and added to a 32 oz. bottle. This bottle was agitated and the required aliquot taken for the hourly sample. These steps were repeated each hour during the 5 hour sampling period.

D. DISCUSSION OF RESULTS

The laboratory results as determined on the samples collected at the Steam and Power Plant and the calculated waste loadings are included in Tables XI and XII.

As can be seen in Table XI, the boiler blow down discharge was above the Ministry's objectives for suspended solids at the time of sampling. Table XII indicates, however, that the loadings from the boiler blow-down do not contribute significantly to the total loadings discharged via the 54" sewer to the River.

It can also be seen in Table XII that the Steam and Power Plant discharges about 60 lb./day of phosphorus to the 54" sewer and consequently is the largest contributor of phosphorus in the Polymer complex. As mentioned in the process description, the phosphorus originates from the softener chemicals employed in the process.

The cooling water stream (Pt. 6), indicated in Table XI, was acceptable for discharge to a watercourse at the time of sampling.

It should be pointed out that the aqueous discharge, from the heat exchanger system employed to heat Bunker C fuel was not sampled.

E. CONCLUSIONS AND RECOMMENDATIONS

(a) The Steam and Power Plant discharged approximately 60 lb./day of phosphorus to the St. Clair River via the 54" outfall at the time of the survey. In order to remove this undesirable discharge of phosphorus from the effluent stream, it is recommended that Polymer Corporation Limited initiate an investigation to determine whether the sodium hexa meta phosphate employed in the process can either be replaced with a phosphorus-free chemical or reduced by other in plant improvements or treatment methods.

(b) At the time of the survey, the condensate from the Bunker C heat exchangers was not sampled. It is recommended that this discharge be sampled in the future to determine the acceptability of this discharge.

OUTFALLS

The wastewater flows from the various units within the Polymer complex to the St. Clair River are shown in Diagram #24.

A. SAMPLE POINT LOCATIONS

1. Service Water
   - pump discharge at pump house
2. 72" Sewer
   - manhole (18 + 50S, 27 + 43W)
3. 66" Sewer
   - vacuum pump station at vent (1790-S)
4. Stereo Oily API Separator
   - discharge pit of separator
5. 54" Sewer
   - wooden discharge box to River
6. Steam and Power Plant
   - cooling water discharge to River
7. Township Ditch - Upstream
   - metal bridge upstream of Polymer
8. Township Ditch - Downstream
   - at discharge to River
9. Main Oil Separator Influent
   - inlet box. Unable to obtain a representative sample on August 8 and 9 because of a layer of oil on the surface.

10. Main Oil Separator Effluent

- discharge of separator

B. DISCUSSION OF RESULTS

(a) Effectiveness of Treatment System (Main Oil Separator)

Table XVI shows the origin of the wastes received at the main oil separator and the effectiveness of the treatment system for removing free oil. The majority of wastes originate from the Butadiene Unit while small amounts of contaminants are received from the Butyl and Feed Preparation Units. Utilizing these three flows to calculate an influent loading, it can be seen that when compared to the 1968 loading substantial flow and loading reductions have been achieved. This has resulted from the installation of the Wemco for treatment of a large portion of the Dehydro areas' oily wastes that otherwise would have been directed to and treated by the main oil separator.

A representative sample of the influent stream to the separator was difficult to obtain. Therefore, discussions as to the effectiveness of the separator will be based on the calculated influent results and the laboratory effluent results.

The oil separator has been approximately forty percent effective in reducing the ether extractable or oil content of the wastewater stream. The same effectiveness was also accomplished on the larger volume wastes treated in 1968. The separator did not become more effective with the reduced flow and subsequent increased residence time.

On August 9, 1972, duplicate samples were taken by Ministry staff of the discharge stream from the separator for analysis by Polymer's and the Ministry's laboratories. The Polymer laboratory obtained a net result of 73 ppm for ether extractables and the Ministry laboratory found 37.5 ppm net.

As indicated on Table XVI, the separator discharged about 410 lbs. of oil per day over the three day sampling period. The Polymer monitoring program indicates that over the May to September, 1972 period the separator waste loading of the effluent stream was 600 lbs./day.

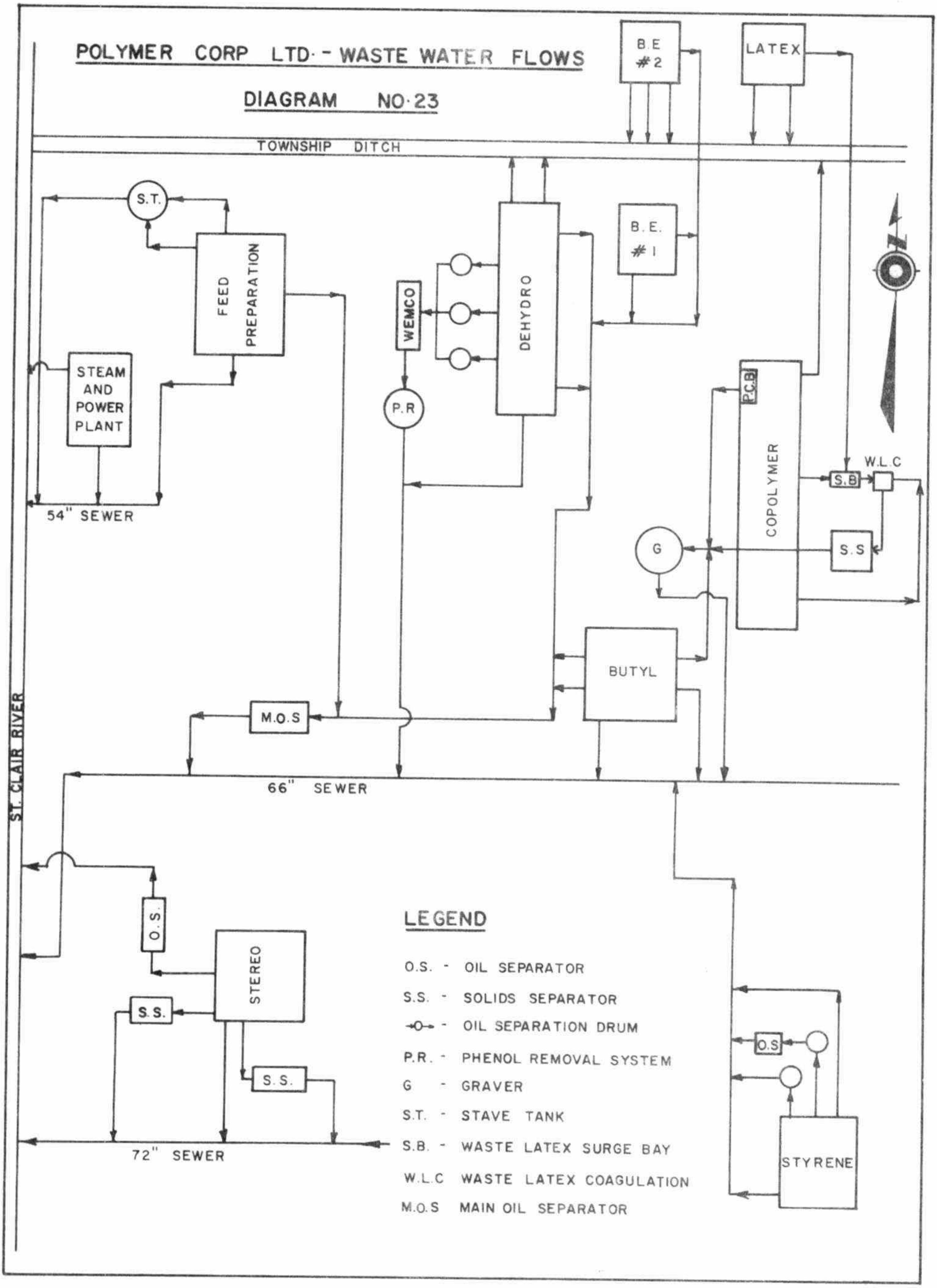
Table XVI further indicates that the effluent stream from the main oil separator was above Ministry objectives at the time of the sampling for suspended solids, BOD and phenols as well as ether extractables.

(b) Battery Limits

Polymer Corporation Limited discharges approximately 135 million gallons per day of water to the St. Clair River. The largest portion of this flow is used as cooling water and as such should contain little or no contamination. However, these cooling water flows dilute the contaminated flows that

POLYMER CORP LTD. - WASTE WATER FLOWS

DIAGRAM NO. 23



LEGEND

O.S. - OIL SEPARATOR
S.S. - SOLIDS SEPARATOR
→O→ - OIL SEPARATION DRUM
P.R. - PHENOL REMOVAL SYSTEM
G - GRAVER
S.T. - STAVE TANK
S.B. - WASTE LATEX SURGE BAY
W.L.C WASTE LATEX COAGULATION
M.O.S MAIN OIL SEPARATOR

are discharged from the units, with the net result that, concentration, a primary measuring tool, is at times, of little value. Therefore concentration measurements at the unit battery limits must be augmented by waste loadings to determine the acceptability of the waste discharges and the necessity for treatment. These measurements will be coupled, whenever possible, with literature data in order to place the quality of the wastewater discharged through each outfall in a better perspective for discussion. Literature data concerning acute toxicity of various compounds is readily available. However, literature data pertaining to sub-lethal or chronic effects is limited. In general, it can be expected that the sub-lethal concentrations would be considerably lower than the acutely toxic concentrations.

Suspended Solids

TABLE A (NET)

66" Sewer	16ppm	9,760 lb./day
54" Sewer	21ppm	3,360 lb./day
TOTAL PLANT DISCHARGE		14,600 lb./day

Suspended Solids is a most important parameter when determining the acceptability of a particular wastewater discharge. Contaminants of this nature can affect the quality of the receiving stream by a number of methods. Settleable solids can create accumulations of wastes on the bottom of a stream thereby adversely affecting the fish communities by covering food and possible spawning grounds. Colloidal and floating solids influence the watercourse by inhibiting the penetration of sunlight needed for normal photosynthetic production and in some cases by transferring toxic components to the water. Colloidal solids, more directly endanger the fish community by asphyxiation through the clogging of the gills. Floatable solids have the undesirable characteristic of being aesthetically objectionable.

As shown of Table XX, Polymer Corporation Limited deposits approximately 14,600 lb./day of suspended solids into the River. This figure was derived as the sum of the average loading obtained on August 8, 9 and 10, 1972 from each outfall.

It can be seen from Table XIII that on August 8, 1972, the suspended solids result for the 66" sewer was significantly higher than those obtained on August 9 and 10, 1972. Since the 66" sewer is the largest contributor of suspended solids in the complex, this high result significantly affected the overall loading figure for the sampling period. According to Polymer Corporation Limited monitoring program, results of the magnitude are infrequent but they do intermittently occur.

In the case of the August 8, 1972 results, the plant would have discharged approximately 18,000 lbs./day of suspended solids. Utilizing the August 9 and 10, 1972 results alone, the plant averages approximately 10,000 lbs./day of suspended solids discharged. On the basis of the results obtained for the complete sampling program on August 8, 9 and 10, 1972, Polymer Corporation Limited contributed 23% of the total suspended solids loading from industrial sources to the St. Clair River during 1972.

As displayed on Tables IX and XIII, the loading in the 54" sewer is based on an average which was derived from the high results obtained on August 10 and 28, 1972 as well as the low on August 8, 9 and 10, 1972. Because of the wide variation between the individual results it is suspected that there is a batch discharge every few days. Since there is not a corresponding increase in oxygen demand and total organic carbon, the contaminants could be inorganic and therefore may emanate from the Steam and Power Plant. It should be noted that the Polymer monitoring program also detected the periodically high results in the May to September sampling period. On the days when the concentration fluctuated on the high side approximately 10,000 lbs./day were discharged to the river via the 54" sewer.

Over the three day sampling period as shown on Table XIII, the 66" sewer discharged an average of 9,760 lbs./day of suspended solids. It is evident in Table XVII, that the loading to this sewer, as calculated by summing the loadings of the contributing streams is less than the loading obtained by utilizing data provided by the laboratory analysis of samples taken at the outfall. As these samples were not selected during the same period, it is possible that this apparent discrepancy may be caused by fluctuating conditions in the discharge.

The largest contributor to the suspended solids loading at the 66" sewer is the Copolymer Graver. The solids from this system are predominantly rubber particles which have been flocculated with alum in order to promote settling. It is expected that solids of this nature discharged to the River could settle to the bottom and, over the years, accumulate, creating noxious and uninhabitable conditions.

Dissolved Solids

TABLE B (NET)

66" Sewer	166 ppm	101,200 lb./day
54" Sewer	122 ppm	19,520 lb./day
TOTAL PLANT DISCHARGE		131,042 lb./day

Dissolved solids can effect the receiving stream in several ways. All salts in solution change the physical and chemical nature of the water and exert osmotic pressure. Some salts can contribute toxic effects to the watercourse as well.

Polymer Corporation Limited contributes approximately 131,000 lb./day of dissolved solids to the St. Clair River. This amounts to 6% of the total dissolved solids discharged to the River by all industries along the River.

Most of the dissolved solids exit via the 66" sewer and the 54" sewer. The 66" sewer contributes approximately 100,000 lb./day to the River. These solids originate from the Copolymer Unit where salt solutions are used to coagulate the latex. These salts are comprised mainly of sodium chloride with smaller amounts of calcium chloride and aluminum sulphate.

Approximately 20,000 lb./day of dissolved solids emanate from the 54" sewer. They originate from the stave tank, boiler blow down and the Feed Preparation Unit cooling water streams.

It can be seen in Table X, that the majority of dissolved solids originate from the stave tank and more specifically from the acid influent stream to the stave tank. On August 29, 1972 the dissolved solids in the acid influent stream to the stave tank (475 ppm) were significantly higher than on August 28, 1972 (160 ppm). On August 29, 1972, acid wastes from the FRP storage tanks were being added to the influent stream for neutralization in the stave tank, thereby causing the increased dissolved solids levels reported above.

The dissolved solid waste from the boiler blow downs is the second largest contributor of dissolved solids to the 54" sewer. This discharge would contain dissolved sodium salts from the treatment chemicals.

BOD, COD and TOC

TABLE C (NET)

	BOD		COD		TOC	
	ppm	lb./day	ppm	lb./day	ppm	lb./day
Stereo Oily Separator	134	844	232	1,462	70	441
66" Sewer	27	16,470	35	21,350	8	4,880
54" Sewer	11.0	1,760	421	67.400	71	11,360
TOTAL PLANT DISCHARGE		20,334		90,212		16,681

Oxygen demand parameters are employed to measure the oxygen required to oxidize the contaminants in a particular waste stream to the less complex end-products. On the St. Clair River however, under present conditions, oxygen depletion is very unlikely because of the turbulence and volume of the flow in the River. The oxygen demand parameters are therefore employed to determine the organic content of the wastewater. In this report they have been coupled with the total organic carbon measurement and in some cases with gas chromatographic analysis.

Knowledge of the organic content of a wastewater is important for a number of reasons. Certain organic chemicals or their decomposition products can be toxic to fish and other communities and the same or other organics can result in odours emanating from the receiving watercourse and/or in the tainting of fish flesh.

Polymer Corporation Limited discharges approximately 26% (20,300 lb./day) of the total BOD, 49% (90,200 lb./day) of the total COD and 33% (16,700 lb./day) of the total TOC loadings to the St. Clair River from industrial sources.

The majority of organic compounds as evidenced by the BOD, COD and TOC results are discharged from the 66" sewer, the 54" sewer and the Stereo separator. It can be noted initially that the 66" sewer and the Stereo separator discharges are above the Ministry BOD objective (15 ppm) for wastewaters discharging to a watercourse. It can further be seen that the 66" sewer, the 54" sewer and the Stereo separator are above the COD value (30 ppm) that is considered acceptable for discharges to a watercourse. Because the TOC measurement is a relatively new common analytical tool, no comments can be made concerning acceptable concentrations at this time.

As shown on Table XV, the Stereo separator discharges approximately 840 lb./day of BOD, 1,460 lb./day of COD and 440 lb./day of TOC. Although these figures represent a small portion of the total organics discharged from the plant, the BOD and TOC concentrations are far above the values obtained at other outfalls. Duplicate samples collected on August 10, 1972 for analysis by both the Polymer and Ministry laboratories gave results of 210 ppm COD by the Ministry and 52 ppm COD by Polymer Corporation Limited.

The BOD/COD and BOC/TOC ratios of the wastes discharged from the separator indicate that the discharge could contain aliphatic hydrocarbons as well as aromatics (3). The contaminants could include butadiene, methanol, hexane and benzene. Since gas chromatographic analyses are not available, the concentrations of the individual contaminants are not known.

Literature studies (1) indicate that the toxicity threshold for benzene is as low as 5 mg./l. and has a 24 hour T.L.M. as low as 20 mg./l. (2). Methanol is essentially non-toxic in concentrations as high as several thousands of mg./l. (1). Butadiene has a 24 hour T.L.M. of 71.5 mg./l. (2).

The 66" sewer currently discharges approximately 16,500 lb./day BOD, 21,400 lb./day COD and 4,900 lb./day TOC. This represents the majority of the BOD loading from the plant and a large portion of the COD and TOC loadings. According to the Polymer Corporation Limited monitoring program the 66" sewer discharges approximately 45,750 lb./day COD.

As shown on Table XVII, the Butadiene Unit is the largest contributor of organic contaminants to the 66" sewer. This unit discharges about 3,350 lb./day of BOD, 5,050 lb./day of COD and 2,420 lb./day of TOC. The organic contaminants in this stream are mainly quench oil with smaller amounts of various carbonyl compounds. Quench oil has been identified by previous studies (4), as having the potential to contribute undesirable odours to both fish and the watercourse.

Gas chromatographic analysis of the effluent stream at the oil and phenol removal system indicates that 225 ppm of acetone and 100 ppm of methyl isobutyl ketone are present. It is expected that the concentrations at the outfall would be 4.45 ppm for acetone and 1.97 ppm for methyl isobutyl ketone after dilution by the 66" sewer. Literature data indicates that the 96 hour T.L.M. for acetone is 13,000 mg./l. (2).

The Copolymer Unit discharges approximately 1,860 lb./day of BOD, 5,800 lb./day of COD and 1,170 lb./day of TOC to the 66" sewer.

The organic contaminants in the stream could consist of any or all of the organic chemicals used in the unit. These could include styrene, butadiene,acrylonitrile, soaps and stabilizers. Gas chromatographic analysis at the outfall of the 66" sewer to the River indicates that no detectable styrene is present.

The 24 hour T.L.M. for styrene is as low as 25.1 mg./l. and acrylonitrile has a 96 hour T.L.M. as low as 11.8 mg./l.

(2) towards certain species of aquatic life.

The main oil separator discharges about 636 lb./day of BOD, 3,300 lb./day of COD and 1,030 lb./day of TOC. The contaminants would consist mainly of quench oil and smaller amounts of acetonitrile.

Acetonitrile has a 96 hour T.L.M. as low as 1,000 mg./l. (1).

Although the COD and TOC results at the battery limits of the Styrene Unit indicate that no dissolved organics are present, the calculated loadings obtained by summing the individual treatment system indicate otherwise. According to the calculated results this unit discharges approximately 1,280 lb./day of COD and 280 lb./day of TOC. The organic contaminants in this wastewater stream would contain benzene, ethylbenzene and styrene. According to Gas Chromatographic analysis of a sample collected on June 8, 1972 at the oily water API separator in this unit, this wastewater stream contain 46 ppm benzene, 7 ppm styrene and 6 ppm ethylbenzene. The literature states that the toxicity threshold for benzene is as low as 5 mg./l. and has a 24 hr. T.L.M. as low as 20 mg./l. (2). This data therefore shows that the wastewaters discharging from this separator have the potential to be toxic to fish communities. The 24 hour T.L.M. for styrene is as low as 25.1 mg./l.

The largest contributor of COD and TOC from the Polymer complex is the 54" sewer. This sewer discharges approximately 67,400 lb./day of COD and 11,400 lb./day of TOC which originate mainly from the stave tank.

As shown in the literature (3), the low BOD and high COD as displayed in Table XIII are characteristic of tertiary butyl alcohol. Gas chromatographic analysis at the discharge of the stave tank shows that 520 ppm T.B.A. is present. Calculating the capacity of the 54" sewer to dilute this flow, it is expected that the concentration would be approximately 67 ppm at the outfall.

According to the literature (1), tertiary butyl alcohol has a critical range of from 3,000 ppm to 6,000 ppm. Critical range is defined as the range in concentration below which all of four test fish lived for 24 hours and above which all died.

Phenols

TABLE D (NET)

Stereo Separator	53ppb	.33 lb./day
66" Sewer	52ppb	31.7 lb./day
54" Sewer	2.2ppb	.35 lb./day
TOTAL PLANT DISCHARGE		34.6 lb./day

Phenols can affect the receiving watercourse in several ways. Depending on the concentration, these compounds can be toxic to fish and can cause taste problems. Phenolic compounds can also cause odour problems in water supplies.

These odours have been described as medicinal or chemical, especially if the water is chlorinated.

Polymer is the largest single contributor of phenolic compounds to the St. Clair River. The Company discharges approximately 34.6 lb./day or 31% of the total phenolic compounds discharged to the River by all industries. According to the Polymer monitoring program approximately 70 lb./day of phenols are discharged to the River.

Most of the phenols are discharged via the 66" sewer. This sewer has a net concentration that is more than two and one half time the Ministry's 20 ppb objective and results in a net loading of about 32 lb./day. The monitoring program, as performed by Polymer Corporation Limited, indicates that the concentration at the outfall is approximately 115 ppb or five and one-half times the Ministry objective.

Table XVII shows that the largest single source of phenols in the 66" sewer is the Styrene Unit (9.9 lb./day) while smaller but still significant amounts originate from the Copolymer Unit (4.98 lb./day) and the Butadiene Unit (7.9 lb./day). A smaller amount (3.9 lb./day) enters via the main oil separator.

On August 9, 1972 the effluent stream from the Stereo oily water separator showed a net phenol concentration of 196 ppb. Although this figure is not consistent with the other results, it does demonstrate that upsets or spills can occur, resulting in abnormally high concentrations. High concentrations of this nature were also noted during the 1971 summer sampling program when the average net concentration for phenols at this separator was found to be 365 ppb.

Literature studies have shown that phenolic compounds can have a 24 hour T.L.M. that varies from a low of 19.0 mg./l/ to as high as 61 mg./l. (2).

Ether Extractables

Ether extractables can affect the receiving watercourse in several ways. Directly, they can cause toxicity and tainting of the fish community as well as asphyxia through the coating of gills. Indirectly, settlable oils can cover the bottom of a watercourse destroying plant growth and interfering with spawning areas, while some of the organic fractions can biochemically oxidize, deoxygenating the waters. Oils can also create problems by forming a floating net with dead vegetation or silt. Contamination of this nature has been the basis of complaints received from recreational water users on the St. Clair River.

Polymer contributes 1,260 lb./day or approximately 20% of the total ether extractables discharged to the St. Clair River by all industries along the River.

The highest net concentration found at the time of the survey was 1.8 ppm at the 66" sewer. This concentration resulted in a net loading of almost 1,100 lb./day or 87% of the total discharged from the overall complex.

The loading at the discharge of the sewer originated from the main oil separator, the Copolymer Unit and the Butadiene Unit. Although Table XVII shows that no oil was discharged from the Butadiene Unit, triplicate composite samples on the effluent stream of the phenol removal system averaged approximately 250 lb./day. The composite sample at the unit battery limits was taken once and at this sampling point the oily flow was diluted to the detection limits by the cooling water flow. Using the 250 lb./day figure, the sum of the contributing streams more accurately matches the loading figures at the outfall.

The Copolymer Unit is responsible for 380 lb./day of ether extractables in the 66" sewer and is second only to the main oil separator. It should be noted that the value of ether extractables for the Copolymer Unit may not represent oily entirely. A portion of the value may be due to the solubilizing and extraction of rubber particles.

At the time of the survey the 54" sewer discharged on the average 160 lb./day of ether extractables to the River. The sample collected on August 10, 1972 at the outfall of the sewer, however, indicated a net concentration of 3.5 ppm or 560 lb./day. Peaks as high as 5 ppm net have been identified by the Polymer monitoring program.

During the survey one-gallon service water samples were collected for ether extractables from each unit except the Stereo Unit. Ministry analysts were asked to take special precautions to obtain concentration figures as accurate as possible in the expected low concentration range. The results obtained on these samples were all 1 ppm or less than 1 ppm for ether extractables. It should be pointed out that during the May to September period, the Summary Effluent Quality Control Report sheets submitted by Polymer reported ether extractables in the service water that averaged 2.4 ppm. Although the difference is small, the large flows involved create large net loading differences.

Nutrients

During the survey, free ammonia, total kjeldahl nitrogen and total phosphorous were measured to determine the nutrient contribution of Polymer Corporation Limited to the St. Clair River.

Excess nutrients in a body of water are harmful since they can create overabundant and abnormal algal growths.

Subsequently the gross amounts of algae remove oxygen from the waters during the stages of decomposition and drive out the valuable species of fish. Decomposing algae can also produce concomitant odours, reducing the recreational worth of a watercourse.

Polymer contributes 93 lb./day (4% of the total discharged to the St. Clair River from industrial cources) of the total ammonia, 307 lb./day (10%) of total kjeldahl nitrogen and 68.5 lb./day (25%) of total phosphorous.

At the time of the survey, the 66" sewer transferred 61 lbs. of free ammonia, 256 lbs. of total nitrogen and 20 lbs. of phosphorous per day to the River. Table XVII identifies the main oil separator as the origin of free ammonia and the Copolymer Unit as the source of the phosphorous and nitrogen. By assessing the raw materials used in the individual units, it becomes evident that ammonia is a remnant of the cuprous ammonium acetate solvent used in BE #1 while the nitrogen and phosphorous are from the various emulsifying agents used in the Copolymer Unit.

Most of the phosphorous exiting from the Polymer complex does so through the 54" sewer and more specifically from the boiler blow-downs at the Steam and Power Plant. This sewer is responsible for 32 lb./day of phosphorous, along with 32 lb./day of ammonia and 51 lb./day of total kjeldahl nitrogen. The source of the free ammonia and total kjeldahl nitrogen, as shown on Table XVIII, can not be defined.

The phosphorous concentration in the wastewater stream discharged from the boiler blow-down is above the 1 ppm value normally considered acceptable for effluent streams entering a watercourse.

Threshold Odour Number

TABLE E (NET)

	T.O.G.N.
66" sewer	$82,655 \times 10^6$
54" sewer	$12,944 \times 10^6$
TOTAL PLANT DISCHARGE	$95,650 \times 10^6$

Threshold odour numbers provide a method of determining the origin of odours within a manufacturing complex and allow an assessment of the persistence of odours in a watercourse. Threshold odour numbers can also be employed in conjunction with COD and TOC data to identify waste streams that could have the potential to taint fish flesh.

In order to rank the odour bearing streams within the plant, the concept of Threshold Odour Gallon Numbers (T.O.G.N.) was utilized. The T.O.G.N. value is derived as the product of the net laboratory TON and the volume in gallons per day of the waste stream in question.

By assessing the T.O.G.N. values on the loading sheets, it becomes evident that odours are present mainly in the 66" sewer with the main oil separator and the phenol and oil removal system at the Butadiene Unit considered to be the main in-plant contributors. The odours of samples from each of these pointe were reminiscent of the quench oil used in the Dehydrogenation areas. A third flow to the 66" sewer, the Copolymer Unit, contributed smaller but still significant amounts of odour-causing compounds during the survey. The odour of the Copolymer waste stream was characteristic of rubber manufacturing in general, rather than of a specific raw material.

The 54" sewer and the stave tank in particular contributed pungent odours to the River. These garlic-like odours were most probably caused by the T.B.A. present in the flow.

The four most odourous waste streams at the Polymer complex ranked in order of declining T.O.G.N. are as follows.

1. Main oil separator (Butadiene Unit) - quench oil
2. Phenol and oil removal system (Butadiene Unit) - quench oil
3. Stave tank (Feed Preparation Unit) - tertiary butyl alcohol
4. Graver (Copolymer Unit) - rubber manufacturing

According to Wells (4), fish tainting studies at Polymer Corporation Limited during the fall of 1971, indicate that one group of fish subjected to the waters of the 66" sewer smelled and tasted of a reduced hydrocarbon (likely styrene) while the other group of fish had an oily odour resembling that of quench oil and a rubbery taste.

Although the above ranking does not indicate why the styrene taste and odour were present, it should be noted that fish at this station were subjected to slug discharges from the Styrene Unit.

Fish were also subjected to the wastewaters from the 54" sewer during the same fish tainting survey. Fish at this station took on a garlic-like T.B.A. odour prior to cooling and a gasoline or petrochemical-like odour after cooking. The T.O.G.N. and gas chromatographic results found during this industrial wastes survey indicate that T.B.A. emanating from the stave tank probably caused this odour problem. The volatility of T.B.A. is suspected as being the reason for the odour departing upon cooking.

Miscellaneous Contaminants

pH

During this industrial wastes survey, the pH at all outfalls, except the 54" sewer, remained within the Ministry's objective.

Due to fluctuating pH at the stave tank, the pH at the 54" sewer was below the 5.5 to 10.6 objective on August 8, 1972 and at the upper limit on August 10, 1972. Variations of this nature have the potential to kill fish and to increase the toxicity of some chemicals.

Aesthetic Quality

During the survey, it was noted that the aesthetic qualities of the River can be impaired by the discharges from the Polymer manufacturing complex. This impairment is created by the petrochemical odours emanating from the wastewaters. Odours of this nature have the ability to render the watercourse uninviting for recreational purposes.

Complaints are received each year from recreational water users on the St. Clair River concerning floating mats of silt, dead vegetation and oil. It is suspected that Polymer Corporation Limited contributes to this undesirable problem by discharging 1,260 lb./day of ether extractables to the River.

C. GENERAL CONCLUSIONS AND RECOMMENDATIONS

I Conclusions

(a) During the survey it was determined that Polymer Corporation Limited discharges approximately 20,300 lbs. of BOD, 90,200 lbs. of COD and 16,700 lbs. of TOC to the River daily.

The majority of the dissolved organics that the above parameters represent exit from the plant via the 54" sewer and the 66" sewer and originate from the stave tank, the Wemco, the Graver and the main oil separator. These four areas have also been identified in the discussion section as being responsible for the unacceptable taste and odour problems associated with Polymer's waste effluents.

At the time of the survey, a column was being installed in the Feed Preparation Unit to reduce the tertiary butyl alcohol content in the 54" sewer. It is expected that by reducing the tertiary butyl alcohol, corresponding decreases in COD, TOC and TON will be achieved.

Gas chromatographic analysis indicated that none of the compounds measured were above their toxicity limits at the outfall. In general, however, the dissolved organics discharged to the watercourse in concentrations below their toxic levels can impart undesirable taste and odour characteristics to the water and to fish and may have other sub-lethal effects on the aquatic communities.

(b) Polymer Corporation Limited discharges approximately 34.6 lbs./day of phenolic compounds to the St. Clair River. The Stereo separator and the 66" sewer, which are both above the Ministry's 20 ppm objective, have net phenolic concentrations at the outfalls of 55 ppm and 52 ppm respectively. Because of the small flow at the Stereo separator the loadings are small. The flow from the 66" sewer is large and results in a corresponding high and unacceptable loading. The majority of phenols in the 66" sewer originate from the Styrene, Butadiene and Copolymer Units.

(c) Based on the findings of this survey, it has been calculated that the Polymer complex discharges in the order of 1,200 lbs./day of ether extractables to the River. It has been concluded from these results that the majority of the ether extractables originate from the main oil separator, the Wemco and the Graver. A small periodic discharge has also been noted in the 54" sewer.

It is suspected that the ether extractables loading at the main oil separator and the Wemco may be attributable to quench oil. If this is the case, the ether extractables may be responsible for a significant portion of the odours and fish tainting potential in the wastewaters discharged from the plant.

(d) The survey indicated that the net loading of phosphorous to the River from the total complex was 68.5 lbs./day. Most of the phosphorous originates from the Steam and Power Plant where phosphorous containing chelating agents are used to soften the boiler feed water.

(e) Approximately 15,000 lbs./day of suspended solids were discharged during the sampling period to the St. Clair River. Although, this unacceptably high figure may not represent normal conditions, it has been shown that fluctuations are possible at both the 54" and 66" sewers.

At the time of the survey, a post Graver filter was being installed in the Copolymer Unit to reduce the suspended solids content of the single largest contributor.

(f) Approximately 131,000 lbs./day of dissolved solids are discharged to the River each day from Polymer. Most of these dissolved salts originate from the finishing area of the Copolymer Unit.

(g) On one occasion during the limited sampling survey, the pH at the outfall of the 54" sewer dropped to 3.6, well below the Ministry objective of 5.5. Variations of this nature are caused by fluctuating conditions at the stave tank.

(h) In this report it is evident that discrepancies exist between the phenol results obtained at the Ministry and Polymer laboratories. To illustrate this point, it can be pointed out that the total phenolic loadings to the River at the time of the survey as determined by Ministry results were 34.6 lbs./day. During the May to September sampling period the Polymer monitoring program indicated that the average total phenolic loading was 71 lbs./day. Similar differences were noted on samples taken at the Butadiene Unit.

(i) Throughout the survey, discrepancies between the laboratories were also noted for ether extractables. Calculations based on the results as submitted by the Ministry laboratory indicate that approximately 1,200 lbs./day were discharged from the plant while the Polymer monitoring program, during the May to September period, indicated that 1,950 lbs./day were discharged. Once again these discrepancies were evident in duplicate samples taken during the survey within the plant.

II Recommendations

(a) Polymer Corporation Limited should begin to take the necessary steps required to remove the dissolved organics from the wastewater streams of the Wemco, the Graver and the main oil separator in order to reduce the odour, possible fish tainting and other sub-lethal effects of these wastewaters. Dissolved organic reductions can be initiated by improved operation of the treatment systems, increased efficiency within the manufacturing processes and possible process changes. Biological treatment, carbon adsorption, or stripping may be necessary to accomplish the final removal of the organics.

It is also recommended that the stave tank and 54" sewer be resampled when the new T.B.A. column is in operation to ensure that favourable reductions in dissolved organics have been achieved at this outfall.

(b) The phenol results, as found during this survey, indicate that Polymer Corporation Limited should recommence a programme to reduce the amount of phenolic compounds being discharged to the St. Clair River. This program may include the treatment of the highly contaminated stripper bottoms flow in the Styrene Unit, a study into the replacement of phenolic stabilizers in the Copolymer Unit, improved efficiency of the phenol removal system in the Butadiene Unit and the elimination of periodic phenolic discharges from the Stereo separator.

(c) It is recommended that Polymer Corporation Limited, investigate the possibility of further reducing the ether extractables content of the wastewater streams from the Wemco,and the main oil separator. Since these ether extractables may be causing a significant portion of the odours in the waste streams at the Polymer complex, this program could be operated in conjunction with the program to remove the materials causing odours and fish tainting from the waste effluents.

In the case of the Graver, the suspended rubber particles that will be removed by the post-Graver filter should also reduce the ether extractable content of this stream. It is therefore recommended that this system be resampled after the filter is in operation.

(d) Polymer Corporation Limited should initiate an investigation to determine whether the sodium hexa meta phosphate used to treat boiler feed water in the Steam and Power Plant can either be replaced with a phosphorous -free chemical or reduced by other inplant improvements or treatment methods.

(e) It is recommended that the 66" sewer and the Copolymer effluent stream be resampled for suspended solids after the post-Graver filter has been installed. Recommendations concerning further required improvements of the 66" sewer waste flow quality can be made at that time.

The intermittent fluctuation of suspended solids concentrations in the 54" sewer should be investigated with the final aim being the elimination of this source of suspended solids to the 54" sewer.

(f) A policy should be adopted whereby the amount of dissolved solids discharged from the Copolymer finishing building is kept to a minimum. This policy should be aimed at eliminating any unnecessary dumping of the salt solutions used in the coagulation process as well as optimizing brine usage.

(g) The program to maintain the stave tank pH within Ministry objectives should be continued. The investigation should be directed towards more adequate neutralization during surge conditions.

(h) It is recommended that a laboratory cross-check be conducted for the determination of phenols. The purpose of this cross-check would be to identify and correct the discrepancies between the two laboratories.

(i) It is recommended that a laboratory cross-check, similar to the above, be conducted for the determination of ether extractables.

(j) Polymer Corporation Limited should submit to this Ministry a complete and effective waste treatment programe aimed at implementing the aforementioned recommendations.

DUMP SITE

A. DESCRIPTION

The dump site at Polymer Corporation Limited is employed to receive and retain the waste by-products of the Polymer manufacturing processes which cannot, at present, be practicably used in any other process. These wastes are assigned to one of the several designated areas within the site depending on their classification. These classifications are identified as domestic, industrial and hauled liquid wastes.

Domestic wastes, which account for approximately 10 per cent by volume of the total waste loading, can be defined as refuse generated by plant personnel, such as waste paper, lunch wrappings, etc. These are directed to the solids dumping area.

Industrial wastes which amount to 45 per cent by volume of the dump site waste loading, originate from the various manufacturing processes within the plant. These wastes include rubber, glass, wood, used drums, softener sludge and solids from the Latex Sludge Disposal system.

Solids wastes such as rubber, glass, wood, used drums, and L.S.D. solids are deposited in the solids dumping area. Semi-liquid wastes are dumped into lagoon #1.

Hauled liquid wastes account for another 45 per cent by volume of the total dump site waste loading. This material is comprised mainly of rubber water slurries (about 90% solids by volume) and cuprous ammonium acetate solvent from BE #1. These wastes are directed to lagoon #1.

After the completion of the survey, the cuprous ammonium acetate wastes were reduced from more than 650,000 gallons per year to approximately 312,000 gallons per year when the old acetylene removal area in BE #1 was replaced with a new system.

I LAGOON #1 and LAGOON #2

Because of rainfall and the continuous dumping of semi-liquid and liquid wastes into lagoon #1, water is periodically pumped from lagoon #1 to lagoon #2. During this pumping operation, two steps are taken to reduce the contamination of the waste stream. Initially, lime is added to the flow in order to raise the pH and thereby cause the precipitation of the copper in lagoon #2. Secondly, the wastewater is pumped into the air above lagoon #2 via spray nozzles. The exposure to the air allows some of the dissolved ammonia to flash off.

II LAGOON #3

Lagoon #3 is used for the collection and retention of rainwater that is used for fire protection and dilution at the site.

III LAGOON #4 and LAGOON #5

Lagoon #4 and Lagoon #5 are currently out of service. They were previously used to store Graver sludge, before the L.S.D. process at the Copolymer Unit was implemented.

IV LAGOON #6

Lagoon #6 was previously used to store fly ash from the Steam and Power Plant. Since this plant has been converted to natural gas, this area is not used.

B. SOURCES OF LIQUID WASTES

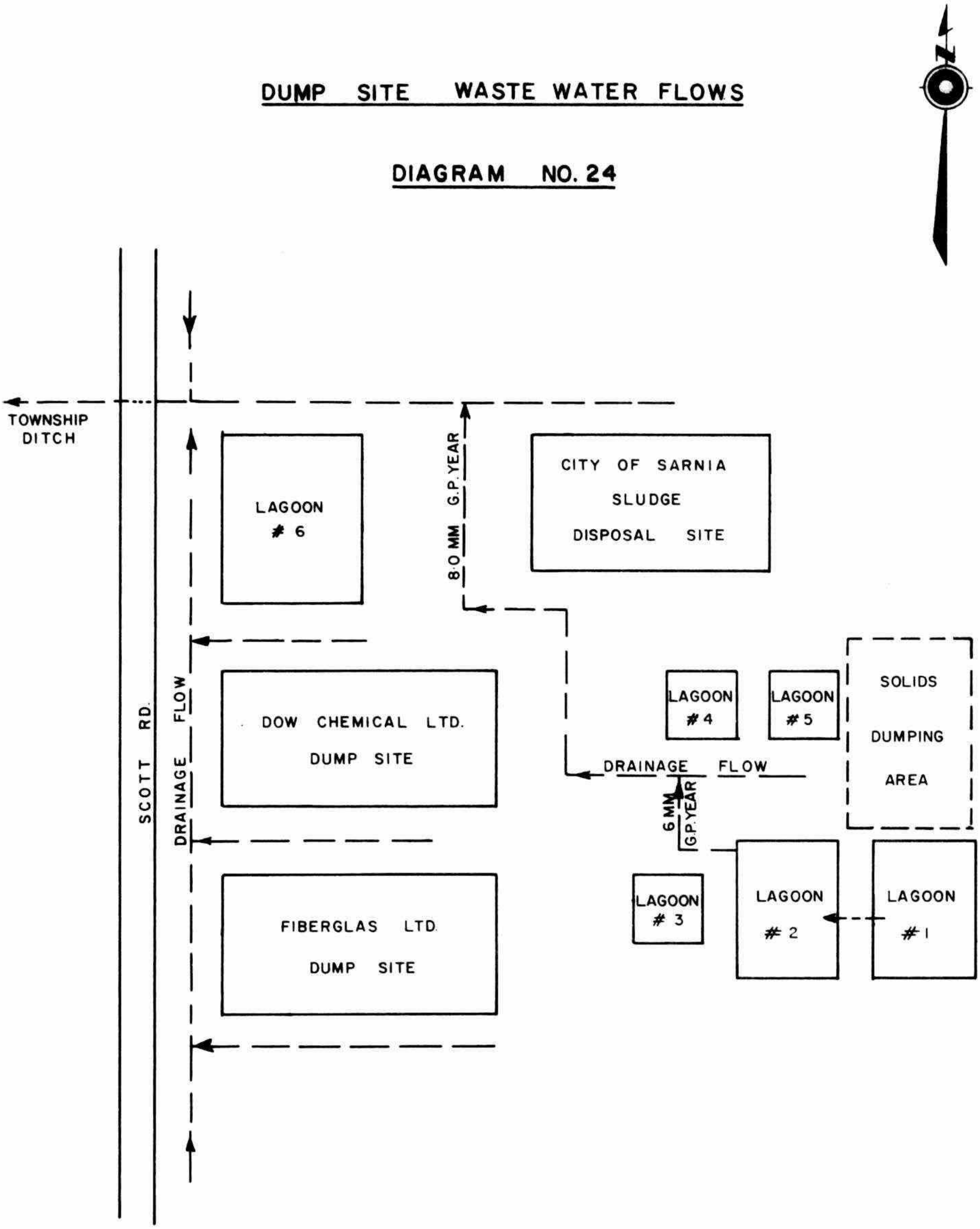
As shown on Diagram 24, liquid wastes are discharged from the dump site to the Township Ditch. These wastes are comprised of leachate, surface run-off and a periodic flow from lagoon #2.

The leachate and surface run-off would contain miscellaneous contaminants from any wastes that were contacted. The discharge from lagoon #2 would contain copper, ammonia, phenolic compounds and dissolved organics.

In order to reduce the immediate effects on the watercourse of the high concentrations of contaminants from lagoon #2, rain-water from lagoon #3 is added for dilution. It should be noted that at time of the survey. lagoon #2 was not being discharged.

DUMP SITE WASTE WATER FLOWS

DIAGRAM NO. 24



C. SAMPLE POINTS AND DESCRIPTION

2. Total Dump Site Effluent
   - weir, after a rainfall
4. Lagoon #2
   - just beneath the liquid surface
5. Lagoon #1
   - just beneath the liquid surface
6. Lagoon #5
   - just beneath the liquid surface

D. DISCUSSION OF RESULTS

The results obtained on the wastewater samples collected from the Polymer dump site are included in Table XXI. The waste loadings calculated from these results are shown in Table XXII.

It can be seen in Table XXII, that the discharge from the dump site (Pt. 2), although above the Ministry's suspended solids and BOD objectives, does not contribute a significant loading to the Township Ditch. The dump site effluent sample represents the quality of the surface leachate discharged from the site after a rainfall. It does not include discharges from the holding lagoons.

The results in Table XXI can be utilized to determine the effectiveness of the copper and free ammonia removal system installed between lagoon #1 (Pt. 5) and lagoon #2

(Pt. 4). From the results, it is evident that approximately ninety per cent of the copper and sixty per cent of the free ammonia are removed by this system. However, the suspended solids, BOD, phenol, ether extractable, copper and ammonia concentrations in the wastewater of lagoon #2 are all above the values normally considered acceptable for wastewaters discharging to a watercourse. It has been stated by Polymer personnel that wastewaters, such as those found in lagoon #2, (exhibiting higher copper concentrations than 3 ppm) would be recycled through the copper and free ammonia removal system to further reduce the copper concentration before discharge. Although it is suspected that at least the BOD and phenol concentrations would remain above Ministry objectives after this second treatment, the actual concentrations are not known.

The results from the samples taken from lagoon #5 indicate that these wastewaters are above Ministry suspended solids, phenol and BOD concentration objectives and at the time of sampling were not acceptable for discharge.

E. CONCLUSIONS AND RECOMMENDATIONS

(a) It is recommended that Polymer Corporation Limited ensure that the wastes, when discharged from lagoon #2, meet all of the Ministry concentration objectives at the dump site battery limits. It is further recommended that the total dump site effluent be resampled by Ministry personnel when lagoon #2 is discharging, to more accurately determine the acceptability of this waste stream.

(b) It is recommended that the wastes collected in lagoon #5 not be discharged to the Township Ditch unless the water quality is improved prior to discharge.

CONTINGENCY PLANNING

During this industrial wastes survey it became evident that the potential for a spill that could impair the St. Clair River existed in several areas. These areas are identified and recommendations for improving the undesirable situations are made.

Stereo Unit

At the time of the survey, a large amount of rubber crumb was noted on the gravelled area beside the reactor and the blending section of the Stereo Unit. Because the gravelled area drains to a storm sewer, it is recommended that Polymer Corporation Limited determine the origin of the crumb and provide additional padding and curbing to eliminate the possibility of material of this nature reaching the River.

Styrene Unit

It was observed during sampling in the Styrene Unit that the gravel on the north side of the styrene process area was contaminated with oily wastes. Samples of the drainage water from this area (Table III) indicate that the wastewater contained significant concentrations of organic and phenolic compounds. It is recommended that these areas be padded and curbed and that the drainage be directed to the oily water system for treatment.

Copolymer Unit

In the past, glass latex transfer lines between the Copolymer and Latex Units have broken, spilling latex into the Township Ditch and thence to the River. Although the glass lines between the Copolymer and Latex Units have been replaced with stainless steel lines, it is recommended that Polymer take adequate preventative measures at any remaining glass lines within the units where the potential for a spill that could reach the St. Clair River exists.

Latex Unit

During the tour of the Latex Units sewers were noted in the floor of the warehouse area. According to Latex personnel these sewers discharge to the Township Ditch. Since a spill in the warehouse would find access to the River via this route, it is recommended that the sewers be plugged. It is understood that these steps have been taken by the Company since the time of the survey.

Butadiene Unit

It was observed during the survey that padded and curbed areas in the Butadiene Extraction #1 area were broken and in ill-repair. It is recommended that Polymer begin a program to upgrade the existing facilities. It is understood that this program has been initiated.

General

In general, it was evident that several areas handling hydrocarbons were not protected against potential spills. Taking into account that the containment of hydrocarbon in operating areas is not desirable because of attendant fire hazards, it is recommended that Polymer commence a long term (5 year) programme to segregate the storm sewers from the areas in question and direct them to a central holding pond for retention before discharge to the River. This pond would be ideally situated in an open area and would include underflow weirs or a valving system to retain spills for treatment or removal.

The following areas have been identified as having the potential for a hydrocarbon spill. There are undoubtably many more areas where spills of this nature could occur.

1. The gravelled area beneath the Stereo recovery system.
2. The area beneath the tank car unloading facility at the Stereo Unit.
3. The area beneath the tank car and tank truck unloading facilities at the Kl area.
4. The tank car unloading facility at the Styrene Unit.
5. Dyked areas surrounding storage tanks where the holding of flammable hydrocarbons is undesirable.

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APPENDIX

Notation for Accompanying Tables

N.R. - Not received by laboratory
* - Not suitable sample
** - Gross
*** - Sample exhausted
# - Volatile organics present
## - Aqueous layer only
### - Odour interference
T.C. - Total carbon
I. - Interference

STEREO UNIT

TABLE I

ANALYTICAL RESULTS

SAMPLE POINT / PARAMETERS	Service Water 1			Finishing Separator Inf. 2			Finishing Separator Eff. 3			Reactor Separator Influent 4			Reactor Separator Effluent 5			Oily Water Separator Influent 6		
	May 23	24	25	May 23	24	25	May 23	24	25	May 23	24	25	May 23	24	25	May 23		
pH	N.R.	8.0	7.9	N.R.	8.2	8.9	9.6	9.5	9.4	7.0	7.2	7.1	7.0	7.1	7.0	7.7	7.2	7.3
Avg.		8.0			8.6			9.5			7.1			7.0			7.4	
Total Solids	N.R.	130	140	N.R.	610	450	640	600	540	160	140	210	150	180	230	330	150	130
Avg.		135			530			593			170			187			140	
Suspended Solids	N.R.	5	10	N.R.	70	70	30	15	40	10	15	40	10	20	40	*	30	20
Avg.		8.0			70			28			22			23			25	
Dissolved Solids	N.R.	125	130	N.R.	540	380	610	585	500	150	125	170	140	160	190	*	120	110
Avg.		128			460			565			148			163			115	
B.O.D.$_5$	N.R.	0.8	0.8	N.R.	50	44	60	55	48	5.5	12	55	10	65	130	1,600	240	140
Avg.		0.8			47			54			24			68			190	
C.O.D.	N.R.	<30	<30	N.R.	165	160	155	115	140	<30	<30	125	<30	90	160	5,300	440	275
Avg.		15			163			137			52			88			358	
T.O.C.	N.R.	25	15	N.R.	31	25	21	37	20	11	20	37.5	4	32	23.5	*	349	207
Avg.		20			28			26			23			20			278	
T.O.N.	N.R.	1:8	1:8	1:60	1:8	1:16	1:30	1:120	1:32	1:40	1:32	1:120	1:100	1:16	1:60	1:200	1:64	1:160
Avg.		1:8			1:37			1:61			1:64			1:59		##	1:112	
Phenols	N.R.	6	8	35	20	80	35	15	30	20	30	50	40	60	25	120	30	30
Avg.		7			45			27			33			42			30	
Ether Extractables	N.R.	3	trace	N.R.	47	39	21	16	11	1	3	11	trace	18	28	240	10	trace
Avg.		2.5			43			16			5			16			6	

SAMPLE POINT / PARAMETER	Oily Water Separator Effluent 7			72" Sewer Discharge 8			Extraction Tower Effl. 9			Refrigeration & Recovery Flow 10			Condensate Boot D416 11		
	May 23	24	25	May 23	24	25	May 23	24	25	May 23	24	25	May 23	24	25
pH	7.0	7.3	7.3	7.5	7.8	7.8		7.4			7.9		7.9		
Avg.		7.3			7.8										
Total Solids	110	170	100	200	210	190		130			140		100		
Avg.		152			198										
Suspended Solids	5	10	5	10	5	10		10			5		5		
Avg.		7.0			8.0										
Dissolved Solids	105	160	95	190	205	180		120			135		95		
Avg.		145			190										
B.O.D.$_5$	240	120	70	7.0	4.0	5.0		900			1.0		48		
Avg.		135			3.5										
C.O.D.	330	260	230	<30	<30	<30		1,850			<30		95		
Avg.		247			15										
T.O.C.	7	18	150	5	13	11		724			17		21		
Avg.		84			8.5										
T.O.N.	1:150	1:32	1:160	1:30	1:32	1:40		1:130			1:24		1:320		
Avg.		1:117			1:35										
Phenols	10	25	30	15	10	10		40			8		4		
Avg.		58			11.5										
Ether Extractables	trace	3	trace	2	2	trace		2			4		1		
Avg.		2			1.5										

STEREO UNIT

TABLE II

NET CONCENTRATIONS AND WASTE LOADINGS

SAMPLE POINT	NO.	YEAR	FLOW	SUSP. SOLIDS		DISS. SOLIDS		B.O.D.		C.O.D.		T.O.C.		PHENOLS		ETHER EXTRACTABLES		T.O.G.N.
			mg/d	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppb	lb/day	ppm	lb/day	
Finishing Separator Effluent	3	1968	.7	12	84	22	154	13.8	97	26	182	-	-	80**	0.56	NEG.	-	
		1972	.55	20	110	437	2,400	53.2	293	122	671	6	33	20	0.11	13.5	74	29.2 X 10^6
Extraction Tower Effluent	9	1972	.07	2.0	1.4	NEG.	-	900	630	1,835	1,285	700	490	33	.02	NEG.	-	8.5 X 10^6
Condensate Boot	11	1972	.03	NEG.	-	NEG.	-	47.2	14.2	80	24	1	.3	NEG.	-	NEG.	-	9.4 X 10^6
Oily Water Separator Influent	6	1968	.54	0	0	NEG.	-	559.2	3,020	721	3,890	-	-	80**	.43	NEG.	-	-
		1972	.63	17	107	NEG.	-	189.2	1,190	343	2,160	258	1,625	23	.15	3.5	22.1	65.5 X 10^6
Oily Water Separator Effluent	7	1968	.54	2	10.8	-	-	-	-	386	2,080	-	-	70**	.38	5	27	-
		1971	.63	0	0	5.1	32	228	1,438	370	2,330	-	-	365	2.3	0	0	-
		1972	.63	NEG.	-	7	44	134	844	232	1,426	70	441	53	.33	0.5	3.2	52.0 X 10^6

STYRENE UNIT

TABLE III

ANALYTICAL RESULTS

SAMPLE POINT / PARAMETER	Service Water 1			Acid-Oily Drum Influent 2			Acid-Oily Drum Effluent 3			Oily Drum Influent 4			Oily Drum Effluent 5			A.P.I. Effluent 6				
	June			June			June			June			June			June			July	
	6	7	8	6	7	8	6	7	8	6	7	8	6	7	8	6	7	8	5	5
pH	8.0	7.9	8.0	3.9			3.9	3.9	3.8	8.8			8.6	9.7	8.6	8.7	9.6	8.7	9.1	9.2
Avg.		8.0						3.9						9.0				9.1		
Total Solids	140	150	190	5,200			4,810	13,270	13,300	230			140	240#	220	160	200#	180	120	120
Avg.		160						10,460						180				145		
Suspended Solids	5	5	5	5			10	10	10	10			5	50#	15	10	30#	10	5	5
Avg.		5						10						10				8		
Dissolved Solids	135	145	185	5,195			4,800	13,260	13,290	220			135	190#	205	150	170#	170	115	115
Avg.		155						10,450						170				138		
B.O.D.	0.8	1.0	1.4	320			550	550	900	3,600			480	1,200	1,200	500	1,400	1,200	850	850
Avg.		1.1						667						960				960		
C.O.D.	<30	<30	<30	940			1,200	1350	1,030	5,300			1,850	3,000	1,700	1,300	2,600	1,800	2,300	2,700
Avg.		15						1,193						2,183				2,140		
T.O.C.	8	10	6	360			535	37	982	*			121	526	335	150	335	***	730	850
Avg.		8						518						344				516		
T.O.N.	1:40	-	-	-			1:1200	1:800	1:2000	-			1:13,000			1:8,000	1:1,000	1:500	-	-
Avg.								1:1333										1:3170		
Phenols (ppb)	2	4	2	500			350	500	500	120			120	350	200	250	400	600	950	-
Avg.		3						450						223				550		
Ether Extractables	<1	<1	<1	1			1	<1	2	70			4	5	2	9	7	2	8	-
Avg.		.5						1						3.7				6.5		
Aluminum								330	960											
Avg.																				
Chlorides			9					5,060	4,470											
Avg.																				
Sulphides														<.1						
Avg.																				
Ethanolamine																		22		
Avg.																				

SAMPLE POINT / PARAMETER	Total Effluent To 66" 7			Cooling Water 8			Storm Sewer 9			Stripper Bottoms 10			Surface Run-Off 11			Flare Seal Water 12		
	June			June			June			June			June			June		
	6	7	8	6	7	8	6	7	8	6	7	8	6	7	8	6	7	8
pH	7.5	7.2	7.3	7.5	7.5	7.4		7.4			8.6				7.1			5.4
Avg.		7.3			7.5													
Total Solids	160	200	180	120	150	160		140			15				420			210
Avg.		180			143													
Suspended Solids	5	20	15	5	5	5		10			<5				60			5
Avg.		13			5													
Dissolved Solids	155	180	165	115	145	155		130			<10				360			205
Avg.		167			138													
B.O.D.	10	11	10	6.0	4.5	20		1.4			9.5				42			600
Avg.		10			10													
C.O.D.	<30	<30	<30	<30	<30	<30		<30			<30				115			1,200
Avg.		15			15													
T.O.C.	8	7	8	8.5	9	3		9			5				36			278
Avg.		8			6.8													
T.O.N.	1:40	1:100	1:100	1:40	1:50	1:50		1:10			1:500				-			1:64,000
Avg.		1:80			1:47													
Phenols (ppb)	60	120	60	4	4	6		8			1,200				200			20
Avg.		80			5													
Ether Extractables	<1	<1	<1	<1	<1	<1		<1			1				14			9
Avg.		.5			.5													
Sulphides																		
Avg.																		420

STYRENE UNIT

TABLE IV

NET CONCENTRATIONS AND WASTE LOADINGS

SAMPLE POINT	NO.	YEAR	FLOW	SUSP. SOLIDS		DISS. SOLIDS		B.O.D.		C.O.D.		T.O.C.		PHENOLS		ETHER EXTRACTABLES		T.O.G.N.
			mg/d	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppb	lb/day	ppm	lb/day	
Acid-Oily Drum Effluent	3	1972	.03	5	1.5	10,300	3,090	666	200	1,178	350	510	153	447	.13	.5	.15	38.8 x 10^6
API Effluent	6	1972	.04	3	1.2	NEG.	-	959	380	2,125	850	508	200	547	.22	6.0	2.4	125 x 10^6
Cooling Water	8	1972	12.5	0	0	NEG.	-	9	1,125	0	0	NEG.	-	2	.25	0	0	87.5 x 10^6
Storm Sewer	9	1972	.7	5	35	NEG.	-	.3	2.1	0	0	1	7	5	.04	0	0	0
Stripper Bottom	10	1972	.27	NEG.	-	NEG.	-	8.4	23	0	0	NEG.	-	1,197	3.2	.5	1.35	124 x 10^6
Flare Seal Water	12	1972	.007	0	0	50	3.5	599	42	1,185	83	270	19	17	.001	8.5	.6	447.7 x 10^6
Total Effluent to 66" Sewer (calculated)		1972	12.9	.29	37.7	24	3,094	13.7	1,772	9.9	1,283	2.9	379	30	3.8	.03	4.5	823 x 10^6
Total Effluent to 66" Sewer (Lab. Results)	7	1968 1972	9.9 12.9	3 8	297 1,032	- 12	- 1,548	12 9	1,190 1,160	11 0	1,100 0	- 0	- 0	73 77	7.2 9.9	3. 0	297. 0	- 516 x 10^6

COPOLYMER UNIT

TABLE V

ANALYTICAL RESULTS

SAMPLE POINT / PARAMETERS	Service Water 1					Oily Butyl Eff.-South 2		Oily Butyl Eff.-North 3		Butyl Finishing Effluent 4		Cooling Flow From Butyl 5	Butyl Storm Sewer 6		Latex #2 Effluent 7	Latex Plant to Ditch-East 8		Latex Plant to Ditch-West 9		Latex Pit Effluent 10
	June 21	27	28	July 4	5	July 4	5	July 4	5	June 21	27	June 28	July 4	5	June 28	June 28	July 4	June 28	July 4	June 28
pH	8.2	7.8	7.9	8.0	7.8	8.4	9.8	8.0	7.6	7.1	7.1	8.1	8.4	8.5	8.0	7.7	7.5	7.9	8.1	10.1
Avg.			7.9			9.1		7.8		7.1			8.5			7.6		8.0		
Total Solids	130	160	150	150	150	150	160	170	160	190	180	160	130	140	150	140	160	150	160	9750
Avg.			148			155		165		185			135			150		155		
Suspended Solids	5	20	10	20	10	10	40	10	10	40	20	10	60	30	20	20	20	20	10	50
Avg.			13			25		10		30			45			20		15		
Dissolved Solids	125	140	140	130	140	140	120	160	150	150	160	150	70	110	130	120	140	130	150	9700
Avg.			135			130		155		155			90			130		140		
B.O.D.	0.8	3.5	1.4	1.6	2.5	2.5	6.5	2.0	5.0	48	24	1.8	5.0	11	3.0	2.5	5.0	3.0	2.0	2,800
Avg.			2.0			4.5		3.5		36			8			3.8		2.5		
C.O.D.	<30	20	<30	<30	<30	<30	<30	<30	<30	120	40	<30	35	45	<30	<30	<30	<30	<30	25,500
Avg.			15			15		15		80			40			15		15		
T.O.C.	2	1	7	5.5	4	9.5	7	9.0	8.0	16.0	4.5	7	13.0	11.0	7	8.0	10.0	9	9	*
Avg.			3.9			8.3		8.5		10.3			12			9		9		
T.O.N.	1:2	-	-	1:20	-	1:80	1:200	1:200	1:25	1:8	1:20	-	1:500	1:200	-	1:30	1:16	1:20	1:16	-
Avg.			1:11			1:140		1:112		1:14			1:350			1:23		1:18		
Phenols (ppb)	2	6	7	9	4	18	10	8	4	8	5	5	11	12	5	6	11	6	6	200
Avg.			5.6			14		6		6.5			11.5			8.5		6		
Ether Extractables	<1	-	<1	<1	<1	2	6	2	3	14	1	<1	2	2	<1	1	2	2	2	-
Avg.			.5			4		2.5		7.5			2			1.5		2		
Free Ammonia	-	-	-	-	.04	-	31	-	.07	-	-	-	-	-	-	-	-	-	-	-
Avg.																				
Total Kjeldahl	-	-	-	-	1.0	-	42	-	1.0	-	-	-	-	-	-	-	-	-	-	-
Avg.																				

SAMPLE POINT / PARAMETER	Cop. Finishing to Primaries 11		Latex Influent to WLSB 12	Total Primary Influent 13	Total Primary Effluent 14		P.C.B. Effluent 15		Total Graver Influent 16			Total Graver Effluent 17			Cop.Cooling Water 18	Cop.Storm Sewer 19	Pilot Plant Effluent 20	L.S.D. Effluent 21	Butyl Storm Sewer 22	
	June 21	27	June 27	June 27	June 21	27	June 21	27	June 21	27	28	June 21	27	28	June 28	June 27	June 27	June 21	July 4	5
pH	5.7	4.7	10.5	6.9	6.1	8.8	7.2	6.9	7.4	6.9	7.1	6.3	7.4	7.0	8.0	7.7	7.0	2.8	8.6	8.9
Avg.	5.0				7.5		7.1			7.1			6.9						8.8	
Total Solids	13,510	8,950	960	9,160	11,230	7,860	640	1,920	6,430	5,440	5,440	5,350	4,990	5,760	180	170	260	3,990	170	180
Avg.	11,230				9,545		1,280			5,770			5,370						175	
Suspended Solids	200	330	120	820	160	100	210	90	450	140	170	60	80	110	20	20	50	110	50	30
Avg.	265				130		150			253			83						40	
Dissolved Solids	13,310	8,620	840	8,340	11,070	7,760	430	1830	5,980	5,300	5,270	5,290	4,910	5,650	160	150	210	3,880	120	150
Avg.	10,956				9,415		1,130			5,516			5,283						135	
B.O.D.	120	90	460	130	100	110	1,000	140	240	90	140	120	80	100	3.0	2.0	60	110	18	6.0
Avg.	105				105		570			157			100						12	
C.O.D.	900	680	1,250	1,300	630	530	3,500	375	1,010	375	850	400	275	315	<30	25	190	630	40	<30
Avg.	790				580		1,938			745			330						28	
T.O.C.	96	90	956	*	82	84	354	66	90	41	90	85	40	69.5	8.5	1.5	30.5	113	*	5
Avg.	93				83		210			73.6			65							
T.O.N.	--	--	--	--	1:200	1:500	1:13,000	1:250	1:800	1:500	1:640	1:2,000	1:500	1:1,000	--	1:40	1:2,000	--	1:20	--
Avg.	--				1:350		1:6625			1:647			1:1,170							
Phenols	1000	350	100	300	775	300	100	50	500	150	150	400	150	250	4	200	350	250	8	6
Avg.	675				538		75			267			267						7	
Ether Extractables	49	136	29	136	39	37	3,800	30	94	31	37	17	26	19	<1	<1	16	24	2	4
Avg.	93				38		1,915			54			21						3	
Total Phosphorus	--	--	--	--	--	--	--	--	--	--	2.8	--	--	2.2	--	--	--	--	--	--
Avg.	--				--		--													
Total Kjeldahl	--	--	--	--	--	--	--	--	--	--	28	--	--	28	--	--	--	--	--	--
Avg.	--				--		--													

COPOLYMER UNIT

TABLE VI

NET CONCENTRATIONS AND WASTE LOADINGS

SAMPLE POINT	NO.	YEAR	FLOW	SUSP. SOLID		DISS. SOLIDS		B.O.D.		C.O.D.		T.O.C.		PHENOLS		ETHER EXTRACTABLES		T.O.G.N.
			mg/d	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppb	lb/day	ppm	lb/day	
Latex Pit Effluent	10	1972	.07	40	28	9,560	6,690	2,800	1,960	25,485	17,800	*	-	193	.14	-	-	-
Latex Influent to Waste Latex Surge Bay	12	1972	.23	100	230	700	1,610	457	1,050	1,230	2,829	955	2,200	94	.22	24	55	-
Copolymer Finishing to Primaries	11	1972	.9	252	2,270	10,830	97,500	103	930	770	6,930	91	820	671	6.	92	830	-
Total Primary Influent	13	1972	1.3	800	10,400	8,200	106,000	127	1,650	1,280	16,640	-	-	294	3.8	135	1,760	-
Total Primary Effluent	14	1972	1.3	117	1,520	9,280	120,600	103	1,340	562	7,306	81	1,050	534	6.9	37	480	426 x 10^6
P.C.B. Effluent	15	1972	.3	137	410	995	2,985	568	1,700	1,920	5,760	208	625	71	.21	1,914	5,740	1,981 x 10^6
Butyl Finishing Effluent	4	1972	.3	17	50	22	66	34	100	62	185	8.3	25	2.5	.01	6.0	18	0
L.S.D. Effluent	21	1972	.04	105	42	3,755	1,500	109	44	615	245	111	45	248	.1	23	9.0	-
Calculated Graver Influent	16	1972			2,020		125,200		3,184		13,500		1,745		7.22		6,250	2,414 x 10^6
Graver Influent (Lab. Results)	16	1969	2.04	312	6,360	-	-	-	-	840	17,140	-	-	500	10.2	-	-	-
		1972	1.9	241	4,580	5,381	102,240	155	2,945	720	13,680	70.3	1,340	262	4.98	53	1,010	1,188 x 10^6
Graver Effluent	17	1969	2.04	146	2,980	-	-	-	-	310	6,320	-	-	400	8.16	-	-	-
		1972	1.9	71	1,350	5,148	97,800	98	1,860	305	5,800	61.7	1,170	262	4.98	20	380	2,181 x 10^6

BUTADIENE UNIT

TABLE VII

ANALYTICAL RESULTS

SAMPLE POINT / PARAMETER	Service Water 1				BE#2 Cooling Water 2	BE#2-East Storm Sewer 3	BE#2-West Storm Sewer 4		BE#2 Oily Discharge 5		BE#1 Oily Discharge 6		Total BE Oily Discharge 7		Dehydro B Oily Discharge 8		Dehydro A Oily Discharge 9		Total Butadiene Oily Discharge 10			Carbonyl Column Influent 11	
	July 18	19	20	Aug. 24	July 18	July 18	July 18	19	July 18	19	July 18	19	July 18	19	July 18	19	July 18	19	July 18	19	20	July 20	Aug. 24
pH	8.1	7.9	8.2	8.2	7.9	7.6	6.6	5.9	8.9	9.4	11.0	11.1	10.5	10.3	7.4	7.0	10.0	10.0	10.1	9.9	10.2	7.9	7.3
Avg.	8.1						6.1		9.2		11.1		10.4		7.2		10.0		10.1			7.6	
Total Solids	170	120	130	150	150	60	60	20	120	130	180	110	140	90	160	120	170	*	180	*	140	100	110
Avg.	143						40		125		145		115		140				160			105	
Suspended Solids	5	5	5	5	5	5	10	0	5	5	90	60	50	30	50	20	60	*	40	*	40	10	10
Avg.	5						5		5		75		40		35				40			10	
Dissolved Solids	165	115	125	145	145	55	50	20	115	125	90	50	90	60	110	100	110	*	140	*	100	90	100
Avg.	138						35		120		70		75		105				120			95	
B.O.D.	0.4	1.4	3.0	1.4	0.2	0.4	34	24	0.8	1.8	26	15	8.0	8.0	40	500	130	320##	130	300	85	260	4,400
Avg.	1.6						29		1.3		21		8		270				108			2,330	
C.O.D.	<30	<30	<30	<30	<30	<30	100	90	<30	<30	580	405	70	40	170	770	510	2200	420	255000	295	11500	16500
Avg.	15						95		15		493		55		470				358			14000	
T.O.C.	11	9	13	4	2	3	34	35	6	11	440	160	56	18	57	89	132	*	170	*	124	23800	*
Avg.	9.3						35		8.5		300		37		73				147				
T.O.N.	-	-	-	-	-	-	-	-	-	-	-	--	-	-	-	-	-	-	1:20,000	1:3200	$1:1.7\times10^{9}$	-	$1:41\times10^{6}$
Avg.																			1:570,000				
Phenols	15	4	4	6	12	8	-	4	4	4	20	20	6	8	60	100	600	500	600	600	500	4,000	7,000
Avg.	7.3						4		4		20		7		80		550		567			5,500	
Ether Extractables	1	1	1	<1	<1	1	9	140	5	6	12	7	7	8	140	7	75	710	120	18%v/v	98	100	180
Avg.	1						75		5.5		9.5		7.5		74				109			135	
Free Ammonia	.2	-	-	-	-	-	-	-	3.6	-	4300	-	690	-	.8	-	150	-	180	-	-	-	-
Avg.																							
Total Kjeldahl	.2	-	-	-	-	-	-	-	5.0	-	5000	-	700	-	11.	-	180	-	220	-	-	-	-
Avg.																							
Copper	-	-	-	-	-	-	-	-	-	-	1.8	-	-	-	-	-	-	-	.25	-	-	-	-
Avg.																							

SAMPLE POINT / PARAMETER	Carbonyl Column Effluent 12		Wemco Influent 13		Wemco Effluent 14		Phenol Removal System Effluent 15			BE#1 and Dehydro A Cooling Water 16	Total Flow to 66" Sewer 17	Dehydro B Cooling Water 18	V.S.R. Discharge 19	BE#2 Solvent Recovery Col. 20	Wemco & Storm Sewer 21	Dehydro A Sep. Drum 22	Dehydro B Sep. Drum 23
	July 20	Aug. 24	July 20	24	July 20	Aug. 24	July 19	20	Aug. 24	August 24	August 24	August 24	August 24	July 19	July 20	August 24	August 24
pH	9.8	9.6	7.7	6.4	10.4	6.4	10.2	10.4	9.1	8.3	8.1	8.3	8.5	7.2	10.3	4.6	4.5
Avg.	9.7		7.1		8.4		9.9										
Total Solids	130	130	90	60	90	40	680	920	390	140	140	130	130	60	910	10	20
Avg.	130		75		65		663										
Suspended Solids	10	10	10	5	5	0	0	5	5	5	5	5	5	5	5	0	0
Avg.	10		8		3		3										
Dissolved Solids	120	120	80	55	85	40	680	915	385	135	135	125	125	55	905	10	20
Avg.	120		68		63		660										
B.O.D.	300	360	70	450	95	500	500	110	460	1.0	18	0.8	0.6	50	110	1,200	900
Avg.	330		260		298		357										
C.O.D.	1250	2000	1550	1950	1190	1130	1,050	1,150	1,190	<30	40	<30	<30	285	1,050	6,100	2450
Avg.	1625		1750		1160		1,130										
T.O.C.	1150	*	1090	*	930	*	830	970	*	3	16	3	3	220	890	*	*
Avg.							900										
T.O.N.	-	1:25,000	-	$1:1.6\times10^{8}$	-	1:50,000	-	1:20,000	$1:1.6\times10^{6}$	-	1:500	-	-	-	-	-	-
Avg.							1:810,000										
Phenols	4000	7,000	7,500	10,000	6,000	12,500	500	300	600	10	45	8	4	###	550	7,750	12,500
Avg.	5,500		8,750		9,250		467										
Ether Extractables	68	190	62	150	5	12	23	26	16	<1	<1	<1	<1	18	22	2,100	160
Avg.	129		106		8.5		22										

BUTADIENE UNIT

TABLE VIII

NET CONCENTRATIONS AND WASTE LOADINGS

SAMPLE POINT	NO.	YEAR	FLOW mg/d	SUSP. SOLIDS ppm	SUSP. SOLIDS lb/day	DISS. SOLIDS ppm	DISS. SOLIDS lb/day	B.O.D. ppm	B.O.D. lb/day	C.O.D. ppm	C.O.D. lb/day	T.O.C. ppm	T.O.C. lb/day	PHENOLS ppb	PHENOLS lb/day	ETHER EXTRACTABLES ppm	ETHER EXTRACTABLES lb/day	T.O.G.N.
BE #2 Oily Discharge	5	1972	.035	0	0	NEG.	-	.4	.14	0	0	NEG.	-	0	0	4.5	1.6	-
BE #1 Oily Discharge	6	1972	.005	70	3.5	NEG.	-	20.1	1.	478	24	290	14.5	10.5	.001	8.5	.4	-
Total BE Oily Discharge	7	1972	.35	35	123	NEG.	-	7.1	24.9	40	140	27	94.5	0	0	6.5	22.8	-
Dehydro B Oily Discharge	8	1972	.10	30	30	NEG.	-	269	269	455	455	63	63	70	.07	73	73	-
Dehydro A Oily Discharge	9	1972	.15	55	82.5	NEG.	-	129	194	495	743	122	183	540	.8	74	111	-
Total Butadiene(Calc) Oily Flow (Lab)	1972 1972		.64	35	236 224	NEG.	-	107	488 685	343	1,340 2,200	147	341 941	557	.87 3.57	108	207 691	- 364,800 x 10^6
Carbonyl Stripping Column Effluent	12	1972	.04	5	2	NEG.	-	328	131	1,610	644	1,140	456	5,495	2.2	128	51	999 x 10^6
Dehydro A SEparation Drum	22	1972	.58	NEG.	-	NEG.	-	1,198	6,950	6,085	35,300	-	-	7,745	45	2,100	12,200	-
Dehydro B Separation Drum	23	1972	.58	NEG.	-	NEG.	-	898	5,210	2,435	14,100	-	-	12,495	72.5	159	922	-
Wemco Influent	13	1972	1.2	3	36	NEG.	-	258	3,100	1,735	21,000	1,077	13,000	8,745	105	105	1,260	190,000,000 x 10^6
Phenol Removal System Effluent	15	1972	1.2	NEG.	-	532	6,400	355	4,260	1,115	14,000	891	10,700	462	5.5	21	252	972,000 x 10^6
Total Effluent to 66" Sewer	17	1972	20.2	0	0	NEG.	-	16.6	3,350	25	5,050	12	2,424	39	7.9	0	0	9,433 x 10^6

FEED PREPARATION UNIT

TABLE IX

ANALYTICAL RESULTS

SAMPLE POINT / PARAMETER	Service Water 1		Caustic Influent To Stave 2		Acid Influent To Stave 3		Stave Tank Effluent 4		Oily Water Sewer 5		Cooling Water 6		54" Discharge To River 8		Rerun Tower Bottoms 9	
	August 28	29	August 28	29	August 28	29	August 28	29	August 28	29	August 28	29	August 28	29	August 28	29
pH	7.8	8.2	1.0	1.3	10.0	1.9	9.1	2.9	11.2		7.9	8.2	8.0	7.8	8.0	8.3
Avg.	8.0		1.2		6.0		6.0				8.1		7.2		8.2	
Total Solids	130	130	*	*	200	480	190	440	620		140	150	180	220	1,280	50
Avg.	130				340		315				145		288		665	
Suspended Solids	5	5	10	10	40	5	20	30	170		5	5	60	5	50	0
Avg.	5		10		23		25				5		27		25	
Dissolved Solids	125	125	-	-	160	475	170	410	450		135	145	120	215	1,230	50
Avg.	125				318		290				140		258		640	
B.O.D.	0.2	0.8	42	55	50	38	34	38	55		1.8	0.8	I	5.0	70	80
Avg.	.5		49		44		36				1.3		12.3		75	
C.O.D.	<30	<30	360	27,000	295	630	205	950	860		<30	<30	375	400	2,000	5,000
Avg.	15		13,680		463		578				15		436		3,500	
T.O.C.	5	9	3600TC	5050TC	2130TC	183	1,830TC	320	1,900TC		12	9	84	108	890TC	1,050TC
Avg.	7		4,325		1,157		1,075				11		79		970	
T.O.N.	-	-	-	-	-	-	1:500	1:1600	-		1:20	1:10	1:640	1:1600	-	-
Avg.							1:1050				1:15		1:870			
Phenols	10	4	0	3	0	20	0	16	40		10	4	8	8	60	12
Avg.	7		1.5		10		8				7		7.2		36	
Ether Extractables	<1	<1	3	3	<1	<1	<1	<1	25		<1	<1	<3	<1	4	<1
Avg.	.5		3		.5		.5				.5		1.5		2.3	

FEED PREPARATION UNIT

TABLE X

NET CONCENTRATIONS AND WASTE LOADINGS

SAMPLE POINT	NO.	YEAR	FLOW	SUSP. SOLIDS		DISS. SOLIDS		B.O.D.		C.O.D.		T.O.C.		PHENOLS		ETHER EXTRACTABLES		T.O.G.N.
			mg/d	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppb	lb/day	ppm	lb/day	
Caustic Influent to Stave	2	1972	.01	5	.5	-	-	48.5	4.85	13,665	1,367	-	-	NEG.	-	2.5	.25	-
Acid Influent to Stave	3	1972	4.29	18	772	193	8,280	43.5	1,870	448	19,220	172	7,380	3	.13	0	0	-
Stave Tank Effluent	4	1972	4.3	20	860	165	7,095	35.5	1,530	563	24,210	311	13,370	1	.04	0	0	$4,373 \times 10^6$
Cooling Water	6	1972	12	0	0	15	1,800	0.8	96	0	0	4	480	0	0	0	0	0
Calculated Contribution of Feed Prep. to 54" Sewer		1972			860		8,895		1,626		24,210		13,850		.04		0	$4,373 \times 10^6$
54" Discharge to River	8	1972	16	21	3,360	122	19,520	11	1,760	421	67,400	71	11,360	2.2	.35	1.0	160	$12,944 \times 10^6$

STEAM AND POWER PLANT

TABLE XI

ANALYTICAL RESULTS

SAMPLE POINT / PARAMETER	Service Water 1		Boiler Blow-Down 7		Cooling Water 6	54" Discharge To River 8	
	August 28	29	August 28	29	August 8	August 28	29
pH	7.8	8.2	11.9	11.7	7.8	8.0	7.8
Avg.	8.0		11.8			7.2	
Total Solids	130	130	1670	1480	140	180	220
Avg.	130		1575			288	
Suspended Solids	5	5	220	150	5	60	5
Avg.	5		185			27	
Dissolved Solids	125	125	1450	1330	135	120	215
Avg.	125		1390			258	
B.O.D.	0.2	0.8	24	13	1.2	1	5.0
Avg.	.5		18.5			12.3	
C.O.D.	<30	<30	40	30	<30	375	400
Avg.	15		35			436	
T.O.C.	5	9	20	21	11	84	108
Avg.	7		20.5			79	
T.O.N.	-	-	-	1:5	1:8	1:640	1:1600
Avg.						1:870	
Phenols	10	4	40	15	4	8	8
Avg.	7		27.5			7.2	
Ether Extractables	<1	<1	3	1	<1	<3	<1
Avg.	.5		2			1.5	
Total Phosphorus				30			.34
Avg.							
Total Sulphur				40			19
Avg.							

STEAM AND POWER PLANT

TABLE XII

NET CONCENTRATIONS AND WASTE LOADINGS

SAMPLE POINT	NO.	YEAR	FLOW	SUSP. SOLIDS		DISS. SOLIDS		B.O.D.		C.O.D.		T.O.C.		PHENOLS		ETHER EXTRACTABLES		TOTAL PHOSPHORUS		TOTAL SULPHUR	
			mg/d	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppb	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day
Boiler Blow Down	7	1972	.2	180	360	1,265	2,530	18	36	20	40	13.5	27	20.5	.041	1.5	3	30**	60	40**	80
54" Discharge to River	8	1972	16.	21	3,360	122	19,520	11	1,760	421	67,400	71	11,360	2.2	.35	1.0	160	.27	43.2	19**	3,040

OUTFALLS

TABLE XIII

ANALYTICAL RESULTS

SAMPLE POINT	Service Water 1			72" Sewer 2			66" Sewer 3			Stereo Oily Water Separator 4			54" Sewer 5			Steam and Power Plant 6			Township Ditch Upstream 7			Township Ditch Effluent 8			MOS Inf. 9	Main Oil Separator Effluent 10		
PARAMETER	August 8	9	10	August 8	9	10	August 8	9	10	August 8	9	10	August 8	9	10	August 8	9	10	August 8	9	10	August 8	9	10	August 10	August 8	9	10
pH	7.7	7.9	8.2	7.9	7.9	8.0	7.4	7.2	7.4	7.3	7.3	7.2	3.6	6.1	10.5	7.8			7.5	7.8	7.5	7.8	8.1	7.9	10.0	8.0	8.6	8.6
Avg.		7.9			7.8			7.3			7.3			7.2						7.6			7.9				8.4	
Total Solids	160	140	160	200	200	190	390	310	310	140	270	120	370	340	330	140			460	380	310	200	170	180	*	130	180	160
Avg.		153			198			337			152			288						383			183				157	
Suspended Solids	10	5	5	10	5	10	40	10	20	10	5	5	5	5	70	5			10	10	20	10	10	10	*	20	40	30
Avg.		7			8.0			23			7.0			27						13			10				30	
Dissolved Solids	150	135	155	190	195	180	350	300	290	130	265	115	365	335	260	135			450	370	290	190	160	170	*	110	140	130
Avg.		147			190			313			145			258						370			173				127	
B.O.D.$_5$	3.5	1.2	1.2	2.0	1.0	3.0	44	34	9.0	170	120	90	10	4.0	30	1.2			3.0	3.0	8.0	5.0	0.4	3.0	85	140	55	48
Avg.		2.0			3.5			29			135			12.3						4.7			4.3				65	
C.O.D.	<30	<30	<30	<30	<30	<30	100	35	<30	200	250	210	660	325	420	<30			<30	40	50	<30	<30	<30	2350	490	275	260
Avg.		15			15			50			247			436						35			15				342	
T.O.C.	13	8	3	11	6	3	34	8	6	267	32	31	16	74	113	11			23	7	12	17	5	2	*	200	70	60
Avg.		8			8.5			16			84			79						14			8				110	
T.O.N.	1:160	1:20	1:2	1:5	1:40	1:60	1:250	1:2000	1:2000	1:80	1:80	1:200	1:1600	1:60	1:200	1:8			1:4	1:60	1:250	1:8	1:60	1:20	-	$1:2\times10^8$	1:133000	1:2500
Avg.		1:61			1:35			1:1416			1:117			1:870						1:105			1:29				1:67,000,000	
Phenols (ppb)	2	4	4	4	8	20	50	60	55	27	200	55	4	4	12	4			12	50	140	5	10	15	400	500	375	300
Avg.		3			11.5			55			58			7.2						67			10				392	
Ether Extractables	<1	<1	<1	1	<1	0	2	3	2	<1	1	trace	<1	1	4	<1			<1	<1	3	<1	<1	trace	0	53	38	35
Avg.		.5			1.5			2.3			2			1.5						1.7			1				42	
Total Kjeldahl Nitrogen		.85	.5		.70	.5		1.2	1.0		.60	.5		1.0	1.0					3.0	6.0		.75	1.0	55		7.5	3.5
Avg.		.68			.6			1.1			.55			1.0						4.5			.88				5.5	
Free Ammonia		.20	.20		.20	.10		.20	.40		.20	<.1		.60	.20					.80	2.2		.20	.20	3.8		3.0	2.2
Avg.		.20			.15			.30			.15			.40						1.5			.20				2.6	
Total Phosphorus		.050	.1		.050	.1		.065	.15		.080	.20		.12	.4					.23	.15		.055	.1	.35		.14	.10
Avg.		.075			.075			.108			.14			.38						.19			.078				.12	

72" SEWER WASTE LOADING

TABLE XIV

NET CONCENTRATIONS AND WASTE LOADINGS

SAMPLE POINT	NO.	YEAR	FLOW	SUSP.SOLIDS		DISS.SOLIDS		B.O.D.		C.O.D.		T.O.C.		PHENOLS		ETHER EXTRACTABLES		FREE AMMONIA		TOTAL KJELDAHL		TOTAL PHOSPHORUS		T.O.G.N.
			mg/d	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppb	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	
Finishing Separator Effluent	3	1972	.55	20	110	437	2,400	53.2	293	122	670	6	33	20	.11	13.5	74	-	-	-	-	-	-	29.2×10^6
Reactor Separator Effluent	5	1972	.07	15	11	35	25	67.2	47	73	51	0	0	35	.03	13.5	9.5	-	-	-	-	-	-	3.57×10^6
Calculated Loading for 72" Sewer (3 + 5)		1972			121		2,425		340		721		33		.14		83.5	-	-	-	-	-	-	32.8×10^6
72" Sewer	2	1968	10.0	2.0	200	-	-	1.4	140	10	1,000	-	-	20**	2.0	1	100	-	-	-	-	-	-	-
		1971	6.2	0	0	90	5,580	4.4	273	0	0	-	-	9.7	.6	0	0	0	0	0	0	.01	0.6	-
		1972	6.2	1.0	62	52	3,220	2.1	130	0	0	NEG.	-	6.5	.4	0	0	NEG.	-	NEG.	-	0	0	0

STEREO OILY SEPARATOR

TABLE XV

NET CONCENTRATIONS AND WASTE LOADINGS

SAMPLE POINT	NO.	YEAR	FLOW	SUSP. SOLIDS		DISS. SOLIDS		B.O.D.		C.O.D.		T.O.C.		PHENOLS		ETHER EXTRACTABLES		FREE AMMONIA		TOTAL KJELDAHL		TOTAL PHOSPHORUS		T.O.G.N.
			mg/d	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppb	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	
Stereo Separator Effluent	4	1968	.54	2	10.8	-	-	-	-	386	2,080	-	-	70	.38	5	27	-	-	-	-	-	-	
		1971	.63	0	0	5.1	32	228	1,438	370	2,330	-	-	365	2.3	0	0	0	0	0	0	0	0	-
		1972	.63	NEG.	-	7	44	134	844	232	1,462	70	441	53	.33	.5	3.2	NEG.	-	NEG.	-	.065	.41	52.0×10^6

MAIN OIL SEPARATOR

TABLE XVI

NET CONCENTRATIONS AND WASTE LOADINGS

SAMPLE POINT	NO.	YEAR	FLOW mg/d	SUSP. SOLIDS ppm	SUSP. SOLIDS lb/day	DISS. SOLIDS ppm	DISS. SOLIDS lb/day	B.O.D. ppm	B.O.D. lb/day	C.O.D. ppm	C.O.D. lb/day	T.O.C. ppm	T.O.C. lb/day	PHENOLS ppb	PHENOLS lb/day
Total Butadiene Oily Discharge	10	1972	.64	35	224	NEG.	-	107	685	343	2,200	136	870	560	3.58
Total Butyl Oily Discharge	(2+3)	1972	.3	2.5	7.5	7	21	1.9	5.7	0	0	3.6	10.8	3.5	.011
Total Feed Prep. Oily Discharge		1972	.02	165	33	325	65	54.8	11.	845	169	1,885	377	30	.006
Calculated MOS Influent		**1968	2.90		5,020		-	-	-		67,000		-		84.4
		1972	1.01		265		86		702		2,369		1,258		3.60
MOS Influent		1972	1.01	-	-	-	-	83.8	846	2,335	23,584	-	-	396	4.0
MOS Effluent		**1968	2.5	36	900	-	-	-	-	1,500	37.500	-	-	2,000	50.0
		1972	1.01	23	232	NEG.	-	63.	636	327	3,300	102	1,030	389	3.93

SAMPLE POINT	NO.	YEAR	FLOW mg/d	EHTER EXTRACTABLES ppm	EHTER EXTRACTABLES lb/day	FREE AMMONIA ppm	FREE AMMONIA lb/day	TOTAL KJELDAHL ppm	TOTAL KJELDAHL lb/day	TOTAL PHOSPHORUS ppm	TOTAL PHOSPHORUS lb/day	T.O.G.N.
Total Butadiene Oily Discharge	10	1972	64	108	691	180	1,152	220	1,410	-	-	$364,800 \times 10^6$
Total Butyl Oily Discharge	(2+3)	1972	.3	2.8	8.4	15.5	46.5	20.5	61.5	-	-	32×10^6
Total Feed Prep. Oily Discharge		1972	.02	24.5	4.9	-	-	-	-	-	-	-
Calculated MOS Influent		**1968	2.90		9,710		1,199		1,472	-	-	$364,832 \times 10^6$
		1972	1.01		704							
MOS Influent		1972	1.01	0	0	3.6	36.4	54.5	550.5	.25	2.5	-
MOS Effluent		**1968	2.5	223	5,570	-	-	-	-	-	-	-
		1972	1.01	41	414	2.4	24.2	4.82	48.7	.045	.45	$67,700 \times 10^9$

66" Sewer

TABLE XVII

NET CONCENTRATIONS AND WASTE LOADINGS

SAMPLE POINT	NO.	YEAR	FLOW	SUSP. SOLIDS		DISS. SOLIDS		B.O.D.		C.O.D.		T.O.C.		PHENOLS		ETHER EXTRACTABLE		FREE AMMONIA		TOTAL KJELDAHL		TOTAL PHOSPHORUS		T.O.G.N.
			mg/d	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppb	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	
Copolymer Effluent		1972	1.9	71	1,350	5,148	97,800	98	1,860	305	5,800	61.7	1,170	262	4.98	20	380	-	-	28	532	2.2	41.8	2,181 x 10^6
Styrene Effluent		1972	12.9	8	1,032	12	1,548	9	1,160	0	0	0	0	77	9.9	0	0	-	-	-	-	-	-	516 x 10^6
Butadiene Effluent		1972	20.2	0	0	NEG.	-	16.6	3,350	25	5,050	12	2,424	39	7.9	0	0	-	-	-	-	-	-	9,433 x 10^6
Main Oil Separator Effluent		1972	1.01	23	232	NEG.	-	63	636	327	3,300	102	1,030	389	3.93	41	414	2.4	24.2	4.82	48.7	.045	.45	67,700 x 10^9
Calculated 66" Sewer Discharge		1972	61.		2,635		99,348		7,006		14,150		4,624		26.7		794	-	-	-	-	-	-	67,712 x 10^9
66" Sewer Discharge		**1968	87.5	11	9,630	-	-	-	-	297	260,000	-	-	240	210.0	12	10,500	-	-	-	-	-	-	-
		1971	61.	2.5	1,525	163	99,125	17.6	10,735	33	19,825	-	-	35	21.4	1	610	-	1,647	-	3,820	-	24.4	-
		1972	61.	16	9,760	166	101,260	27	16,470	35	21,350	8	4,880	52	31.7	1.8	1,098	.10	61	.42	256	.03	20.1	82,655 x 10^6

54" SEWER

TABLE XVIII

NET CONCENTRATIONS AND WASTE LOADINGS

SAMPLE POINT	NO.	YEAR	FLOW mg/d	SUSP. SOLIDS ppm	SUSP. SOLIDS lb/day	DISS. SOLIDS ppm	DISS. SOLIDS lb/day	B.O.D. ppm	B.O.D. lb/day	C.O.D. ppm	C.O.D. lb/day	T.O.C. ppm	T.O.C. lb/day	PHENOLS ppb	PHENOLS lb/day	ETHER EXTRACTABLES ppm	ETHER EXTRACTABLES lb/day	FREE AMMONIA ppm	FREE AMMONIA lb/day	TOTAL KJELDAHL ppm	TOTAL KJELDAHL lb/day	TOTAL PHOSPHORUS ppm	TOTAL PHOSPHORUS lb/day	TOTAL SULPHUR ppm	TOTAL SULPHUR lb/day	T.O.G.N.
Feed Prep. Unit Effluent	6	1972	12	0	0	15	1,800	0.8	96	0	0	4	480	0	0	0	0	-	-	-	-	-	-	-	-	0
Stave Tank Effluent	4	1972	4.3	20	860	165	7,095	35.5	1,530	563	24,210	311	13,370	1	.04	0	0	-	-	-	-	-	-	-	-	$4,373 \times 10^6$
Steam and Power Plant	7	1972	.2	180	360	1,265	2,530	18	36.0	20	40	13.5	27.0	20.5	.041	1.5	3.0	-	-	-	-	30	60**	40	80**	0
Calculated Waste Loading		1972	16.4		1,220		11,425		1,662		24,250		13,877		.081		3.0	-	-	-	-	-	60**		80**	$4,373 \times 10^6$
54" Discharge	8	**1968	31.1	20	6,220	-	-	-		115	35,800	-	-	50	15.6	6	1,870	-	-	-	-	-	-	-	-	-
		1971	16.	35	5,600	10	1,600	119	19,040	303	48,400	-	-	.9	.15	0	-	0	0	.15	24	-	44.8	-	0	-
		1972	16.	21	3,360	122	19,520	11.0	1,760	421	67,400	71	11,360	2.2	.35	1.0	160	.2	32	.32	51.2	.27	43.2	19	3040**	$12,944 \times 10^6$

TOWNSHIP DITCH

TABLE XIX

NET CONCENTRATIONS AND WASTE LOADINGS

SAMPLE POINT	NO.	YEAR	FLOW mg/d	SUSP. SOLIDS ppm	SUSP. SOLIDS lb/day	DISS. SOLIDS ppm	DISS. SOLIDS lb/day	B.O.D. ppm	B.O.D. lb/day	C.O.D. ppm	C.O.D. lb/day	T.O.C. ppm	T.O.C. lb/day	PHENOLS ppb	PHENOLS lb/day	ETHER EXTRACTABLES ppm	ETHER EXTRACTABLES lb/day	FREE AMMONIA ppm	FREE AMMONIA lb/day	TOTAL KJELDAHL ppm	TOTAL KJELDAHL lb/day	TOTAL PHOSPHORUS ppm	TOTAL PHOSPHORUS lb/day	T.O.G.N.
Copolymer Cooling Water	18	**1968	17.2	5	860	-	-	-	-	11	1,900	-	-	12	2.06	trace	-	-	-	-	-	-	-	-
		1972	20	10	2,000	20	4,000	1.6	320	0	0	1.5	300	NEG.	-	0	0	-	-	-	-	-	-	-
Latex Unit Discharge East	8	**1968	2.5	5	125	-	-	-	-	9	225	-	-	15	0.37	1	25	-	-	-	-	-	-	-
		1972	5.9	5	295	NEG.	-	2.3	136	0	0	2.8	89	.5	.03	1.0	59	-	-	-	-	-	-	0
Latex Unit Discharge West	9	**1968	1.4	5	70	-	-	-	-	11	154	-	-	10	0.14	trace	-	-	-	-	-	-	-	-
		1972	2.5	0	0	5	125	1.0	25	0	0	2.8	70	NEG.	-	1.5	38	-	-	-	-	-	-	0
Butadiene #2 Cooling Water	2	**1968	3.5	4	140	-	-	-	-	9	315	-	-	15	0.52	2	70	-	-	-	-	-	-	-
		1972	6.8	0	0	NEG.	-	NEG.	-	0	0	NEG.	-	NEG.	-	NEG.	-	-	-	-	-	-	-	-
Butadiene #2 Storm Sewer-East	3	**1968	1.6	67	1,070	-	-	-	-	205	3,280	-	-	20	.32	2	32	-	-	-	-	-	-	-
		1972	.03	0	0	NEG.	-	0	0	0	0	NEG.	-	NEG.	-	0	0	-	-	-	-	-	-	-
Butadiene #2 Storm Sewer-West	4	**1968	.16	46	74	-	-	-	-	251	402	-	-	60	0.1	2	3	-	-	-	-	-	-	-
		1972	.15	0	0	NEG.	-	28.1	9.8	80	28	25	8.8	NEG.	-	74	26	-	-	-	-	-	-	-
Dehydro B Cooling Water	18	**1968	9.8	4	400	-	-	-	-	31	304	-	-	50	4.9	0	0	-	-	-	-	-	-	-
		1972	16.8	0	0	NEG.	-	NEG.	-	0	0	NEG.	-	2	.34	0	0	-	-	-	-	-	-	-
Vent Steam Recovery	19	**1968	2.4	7	168	-	-	-	-	9	216	-	-	20	0.48	2	48	-	-	-	-	-	-	-
		1972	2.5	0	0	NEG.	-	NEG.	-	0	0	NEG.	-	NEG.	-	0	0	-	-	-	-	-	-	-
Calculated Polymer Contribution		**1968	38.7		2,912		-		-		6,805		-		8.91		180	-	-	-	-	-	-	-
		1972	49.6		2,295		4,125		491		28		468		.37		123	-	-	-	-	-	-	0
Township Ditch Discharge		1972	52.6	10	5,280	173	90,998	4.3	2,262	15	7,890	8	4,208	10	5.26	1	526	.2	105.2	.88	464	.078	41	0
Upstream Contribution		1972	3.0	13	390	370	11,100	4.7	141	35	1,050	14	420	67	2.0	1.7	51	1.5	45	4.5	135	.19	5.7	132×10^6
Calculated Polymer Contribution		**1968	38.5		3,830		-		-		1,045		-		10.34		1,500		-		-		-	-
		1971	49.6		0		88		278		0		-		1.35		0		0		0		12.8	-
		1972	49.6		1,418		6,998		1,130		NEG.		NEG.		1.77		NEG.		NEG.		NEG.		NEG.	0

POLYMER CORPORATION LIMITED

TABLE XX

NET CONCENTRATIONS AND WASTE LOADINGS

SAMPLE POINT	NO.	YEAR	FLOW	SUSP. SOLIDS		DISS. SOLIDS		B.O.D.		C.O.D.		T.O.C.		PHENOLS		ETHER EXTRACTABLES		FREE AMMONIA		TOTAL KJELDAHL		TOTAL PHOSPHORUS		T.O.G.N.
			mg/d	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppb	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	
Total Plant Waste Loading		1968	169.6		11,938	-	-	-	-		299,340	-	-		238.3**		6,044	-	-	-	-	-	-	-
		1971	133.43		7,125		111,400		31,760		70,550	-	-		24.3		610		1,647		1,805		82.6	95,651 X 10^6
		1972	134.73		14,600		131,042		20,334		90,212		16,681		34.6		1,261		93		307		68.5	
P.C.L. Loading May-Sept (omitting Stereo separator and Twp. Ditch)		1972	83.2		5,550		94,720		-		105,780		-		70.6		1,954	-	-	-	-	-	-	-

DUMP SITE

TABLE XXI

ANALTYICAL RESULTS

SAMPLE POINT / PARAMETER	Total Effluent 2	Lagoon #2 4	Lagoon #1 5	Lagoon #5 6
	September 14	September 14	September 14	September 14
pH Avg.	6.8	7.5	8.9	7.3
Total Solids Avg.	3300	4460	5440	6700
Suspended Solids Avg.	50	100	60	230
Dissolved Solids Avg.	3250	4360	5380	6470
B.O.D. Avg.	20	420	1300	200
C.O.D. Avg.	170	960	3050	800
T.O.C. Avg.	56	974	1256	700 T.C.
T.O.N. Avg.	-	-	-	-
Phenols Avg.	11	165	635	110
Ether Extractables Avg.	7	18	52	17
Copper Avg.	0.44	5.5	54	-
Ammonia Avg.	3.6	140	370	-

DUMP SITE

TABLE XXII

NET CONCENTRATIONS AND WASTE LOADINGS

SAMPLE POINT	NO.	YEAR	FLOW	SUSP. SOLIDS		DISS. SOLIDS		B.O.D.		C.O.D.		T.O.C.		PHENOLS		ETHER EXTRACTABLES		FREE AMMONIA		COPPER	
			mg/d	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day	ppb	lb/day	ppm	lb/day	ppm	lb/day	ppm	lb/day
Dump Site Effluent	2	**1972	.0055	50	2.8	3,250	179	20	1.0	170	9.4	56	3.1	11	0	7	0.39	3.6	.20	.44	.02

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia

Report to: R.A. Breese, Sarnia, Ont.
G. Rees

c.c.

Source: Polymer Corp. Ltd.

Date Sampled: July 5/72 by: S.A.S. P.L.

mm

Lab. No.	5-Day B.O.D.	Solids											
		Total	Susp.	Diss.									
	Methyl Chloride ppm	Isoprene ppm											
T28-53	*	*											

* No methods are available for analysis of Methyl Chloride or Isoprene

T28-53 67 5/7-6C-V-G 1900 hrs. Gallon sample

12-042

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in
mg/litre unless otherwise indicated

Municipality: **Sarnia**

Report to: **R.A. Breeze, 555 Exmouth, Sarnia, Ont.** c.c.
G. Ross

Source: **Polymer Corp. S.T.P.**

Date Sampled: **June 8/72** by: **R.A.N. & P.L.**

mm

Lab. No.	5-Day B.O.D.	Solids											
		Total	Susp.	Diss.									
	Styrene ppm	Benzene ppm	Ethyl Benzene ppm										
T24-1	7	46	6										

T24-1 6VI 8/6-6B-VI-G at 1430 hrs. 1 gallon

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: **Sarnia**
Report to: **R. Breeze, Sarnia**
c.c. **G. Rees**
Source: **Polymer Corp. Limited, Sarnia**
Date Sampled: **May 25/72** by: **RAB/PL**

Lab. No.	5-Day B.O.D.	Solids			ppm Benzene	ppm Hexane							
		Total	Susp.	Diss.									
T22-75					*	*							

* Sample broken by freezing in defective refrigerator

T22-75 3-5A-VI A.P.I. Separator effluent - Grab @ 10:45

All analyses except pH reported in mg/litre unless otherwise indicated

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES
INDUSTRIAL WASTES ANALYSIS

Municipality: Sarnia

Report to: R.A. Breeze, 555 Exmouth, Sarnia, Ont. c.c.
P.L. Diosady
G.A.V. Rees

Source: Polymer Corp. Ltd.

Date Sampled: Aug. 10/72 by: R.A.B. & P.L.

aa

Lab. No.	Styrene ppm
T33-36	*

* No styrene was detected in the sample. Detection limits for styrene 0.02 ppm
However, 0.06 Toluene was present in the sample

T33-36 3VI 10/8 - 3E - VI - C 1445 hrs.)one gallon

MINISTRY OF THE ENVIRONMENT

CHEMICAL LABORATORIES

All analyses except pH reported in mg/litre unless otherwise indicated

INDUSTRIAL WASTES ANALYSIS

Municipality: Sarnia

Report to: R.A. Breeze, 555 Exmouth, Sarnia

c.c.
P. Diosady
G. Rees

Source: Polymer Corp. Ltd.

Date Sampled: Aug. 24/72 by: R.A.B. & P.L.

Lab. No.	ppm Acetone	ppm Methyl iso butyl Ketone	ppm Methyl Vinyl Ketone	ppm Acetaldehyde
T35-23	225	100	*	**

* No standards are at present available for the analysis of Methyl Vinyl Ketone, however, gas chromatographic analysis gave no indication of the presence of any material.

** None detected. Sensitivity limit 5 ppm

T35-23 15VI 24/8-15D-VI-G 1415 hrs. 1 gallon

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia

Source: Polymer Corporation Limited
Sarnia

Date Sampled: July 19/72 by: R.A.B. & P.L.

Report to: R.A. Breeze,
555 Exmouth St.,
Sarnia, Ontario.

c.c. G. Rees
Dr. Berg.

/rd

Lab. No.	5-Day B.O.D.	Solids			ppm Acetonitrile		ppm Acetate						
		Total	Susp.	Diss.									
T30-78					*		*						

* Note
No methods are available at present for the analysis of acetonitrile or acetates.

T30-78 7 V1 19/7 - 7D - V1 1420 Hours - One gallon sample

Please forward the gallon sample to: Dr. Berg

12-042

All analyses except pH reported in
mg/litre unless otherwise indicated

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES
INDUSTRIAL WASTES ANALYSIS

Municipality: Sarnia

Source: Polymer Corp. Ltd.

Date Sampled: Aug. 29/72 by: H.A.B. & P.L.

Report to: R.A. Breeze, 555 Exmouth, Sarnia
C. Rees
P. Diosady

c.c.

mm

Lab. No.	ppm T.B.A. Tert-Butyl-Alcohol												
T35-165	520.												

T35-165 4 VI 29/8-4F-VI-G 1400 hrs. 1 gallon

12-061

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

Page 1 of 3

All analyses except pH reported in p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Sarnia

Report to: R. Breeze, 555 Exmouth St., Sarnia, Ont c.c.

Source: Polymer Corpn. Ltd.

Date Sampled: May 23/72 by: P.L. and R.B.

mm

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	T.O.N.	Ether Solubles	Phenols in ppb	pH at Lab			
		Total	Susp.	Diss.									
T22-171	--	--	--	--	--	--	--	--	35	--			
T22-172	--	--	--	--	--	--	1;60	--	--	--			
T22-173	60.	640	30	610	155	21	--	--	--	9.6			
T22-174	--	--	--	--	--	--	--	21	--	--			
T22-175	--	--	--	--	--	--	--	--	35	--			
T22-176	--	--	--	--	--	--	1:30	--	--	--			
T22-177	5.5	160	10	150	< 30	11	--	--	--	7.0			
T22-178	--	--	--	--	--	--	--	1	--	--			
T22-179	--	--	--	--	--	--	--	--	20	--			
T22-180	--	--	--	--	--	--	1Y40	--	--	--			
T22-181	10.	150	10	140	< 30	4	--	--	--	7.0			

---	2A-I	Stereo Unit - Influent to finishing separator	Composite 1330 - 1630	NOT RECEIVED
---	2A-II	" " " " " "	" " "	" "
---	2A-III	" " " " "	" " "	" "
T22-171	2A-IV	" " " " "	" " "	" "
T22-172	2A-V	" " " "	" " "	
T22-173	3A-I	" " Effluent from " "	" " "	
---	II	" " " " "	" " "	NOT RECEIVED
T22-174	III	" " " " "	" " "	
T22-175	IV	" " " " "	" " "	
T22-176	V	" " " " "	" " "	
T22-177	4A-I	" " Influent to Reactor Separator	" " "	
----	II	" " " " "	" " "	NOT RECEIVED
T22-178	III	" " " " "	" " "	
T22-179	IV	" " " " "	" " "	
T22-180	V	" " " " "	" " "	
T22-181	5A-I	" " Effluent from " "	" " "	
-----	II	" " " " "	" " "	NOT RECEIVED

12-042

ONTARIO WATER RES^^URCES COMMISSION
CHEMICAL L ORATORIES

INDUSTRIAL WASTE ANALYSIS

Page 2 of 3

All analyses except pH reported in p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Sarnia

Report to:

c.c.

Source: Polymer Corpn. Ltd.

Date Sampled: May 23/72 by: P.L. and R.B.

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	T.O.N.	Ether Solubles	Phenols in ppb	pH at Lab			
		Total	Susp.	Diss.									
T22-182	--	--	--	--	--	--	--	Trace	--	--			
T22-183	--	--	--	--	--	--	--	--	40	--			
T22-184	--	--	--	--	--	--	1:100	--	--	--			
T22-185	1,600	330	*	--	5,300	**	--	--	--	7.7			
T22-186	--	--	--	--	--	--	--	240	--	--			
T22-187	--	--	--	--	--	--	--	--	120	--			
T22-188	--	--	--	--	--	--	1:200 ***	--	--	--			
T22-189	240	110	5	105	330	7	--	--	--	7.0			
T22-190	--	--	--	--	--	--	--	Trace	--	--			
T22-191	--	--	--	--	--	--	--	--	10	--			

* Not suitable for this test - oily
** Sample not suitable for this test
*** After decanting off oil layer

T22-182	5A-III	Stereo Unit - Effluent from reactor separator	Composite 1330 - 1630	
T22-183	IV	" " " " " "	" " "	
T22-184	V	" " " " "	" " "	
T22-185	6A-I	" " Influent to A.P.I. Separator	" " "	
---	II	" " " " "	" " "	NOT RECEIVED
T22-186	III	" " " " "	" " "	
T22-187	IV	" " " " "	" " "	
T22-188	V	" " " " "	" " "	
T22-189	7A-I	" " Effluent from A.P.I. "	" " "	
T22---	II	" " " " "	" " "	NOT RECEIVED
T22-190	III	" " " " "	" " "	
T22-191	IV	" " " " "	" " "	

12-042

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre = 1 lb./100,000 Imp. Gals.

Municipality: Sarnia

Report to:

c.c.

Source: Polymer Corpn. Ltd.

Date Sampled: May 23/72 by: P.L. and R.B.

mm

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	T.O.N.	Ether Solubles	Phenols in ppb	pH at Lab			
		Total	Susp.	Diss.									
T22-192	--	--	--	--	--	--	1:150	--	--	--			
T22-193	7.0	200	10	190	< 30	5	--	--	--	7.5			
T22-194	--	--	--	--	--	--	--	2	--	--			
T22-195	--	--	--	--	--	--	--	--	15	--			
T22-196	--	--	--	--	--	--	1:30	--	--	--			
T22-197	48.	100	5	--	95	21	--	--	--	7.9			
T22-198	--	--	--	--	--	--	--	1	--	--			
T22-199	--	--	--	--	--	--	--	--	4	--			
T22-200	--	--	--	--	--	--	1:320	--	--	--			

T22-192	7A-V	Effluent from API Separator	Composite 1330 - 1630	
T22-193	8A-I	72" Sewer to River	" " "	
----	II	" " "	" " "	NOT RECEIVED
T22-194	III	" " "	" " "	
T22-195	IV	" " "	" " "	
T22-196	V	" " "	" " "	
T22-197	9A-I	Condensate Boot $\#_D$ -416	Grab 1430 hrs.	
---	II	" " "	" "	NOT RECEIVED
T22-198	III	" " "	" "	
T22-199	IV	" " "	" "	
T22-200	V	" " "	" "	

~~ONTARIO WATER RESOURCES COMMISSION~~ MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre = 1 lb./100,000 Imp. Gals.

Municipality: Sarnia

Source: Polymer Corporation Ltd.

Date Sampled: May 24/72 by: RAB/PL

Report to:
R. A. Breeze
55 Exmouth St.,
Sarnia, Ontario.

c.c.

sb

Lab. No.	5-Day B.O.D.	Solids			PH	COD	TOC	T.O.N.	Phenols in ppb	Ether Solubles
		Total	Susp.	Diss.						
T21-82	0.8	130	5	---	8.0	<30	25	---	---	---
T21-83	---	---	---	---	---	---	---	---	---	3
T21-84	---	---	---	---	---	---	---	---	6	---
T21-85	---	---	---	---	---	---	---	1:8	---	---
T21-86	50.	610	70	540	8.2	165	31	---	---	---
T21-87	---	---	---	---	---	---	---	---	---	47
T21-88	---	---	---	---	---	---	---	---	20	---
T21-89	---	---	---	---	---	---	---	1:8	---	---
T21-90	55.	600	15	585	9.5	115	37	---	---	---
T21-91	---	---	---	---	---	---	---	---	---	16
T21-92	---	---	---	---	---	---	---	---	15	---
T21-93	---	---	---	---	---	---	---	1:120	---	---
T21-94	12.	140	15	125	7.2	<30	20	---	---	---
T21-95	---	---	---	---	---	---	---	---	---	3
T21-96	---	---	---	---	---	---	---	-- -	30	---
T21-97	---	---	---	---	---	---	---	1:32	---	---
T21-98	65.	180	20	160	7.1	90	32	---	---	---
T21-99	---	---	---	---	---	---	---	---	---	18
T21-100	---	---	---	---	---	---	---	---	60	---
T21-101	---	---	---	---	---	---	---	1:16	---	---
T21-102	240	150	30	120	7.2	440	349	---	---	---

12-042

~~ONTARIO WATER RESOURCES COMMISSION~~ MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre = 1 lb./100,000 Imp. Gals.

Municipality:

Report to:

c.c.

Source: Polymer

Date Sampled: May 24.72

by:

sb

Lab. No.	5-Day B.O.D.	Solids			PH	COD	TOC	T.O.N.	Phenols in ppb	Ether Solubles
		Total	Susp.	Diss.						
T21-103	---	----	----	---	---	---	---	---	---	10
T21-104	---	----	---	---	---	---	---	---	30	---
T21-105	---	---	---	---	---	---	---	1:64	---	---
T21-106	120	170	10	160	7.3	260	18	---	---	---
T21-107	---	---	---	---	---	---	---	---	---	3
T21-108	---	---	---	---	---	---	---	---	25	---
T21-109	---	---	---	---	---	---	---	1:32	---	---
T21-110	4.0	210	5	---	7.8	<30	13	---	---	---
T21-111	---	---	---	---	---	---	---	---	---	2
T21-112	----	---	---	---	---	---	---	---	10	---
T21-113	---	---	---	---	---	---	---	1:32	---	---
T21-114	900	130	10	120	7.4	1850	724	---	---	---
T21-115	---	---	---	---	---	---	---	---	---	2
T21-116	---	---	---	---	---	---	---	---	40	---
T21-117	---	---	---	---	---	---	---	1:130	---	---
T21-118	1.0	140	5	---	7.9	<30	17	---	---	---
T21-119	---	---	---	---	---	---	---	---	---	4
T21-120	---	---	---	---	---	---	---	---	8	---
T21-121	---	---	---	---	---	---	---	1:24	---	---

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality:

Report to:

c.c.

Source:

Date Sampled:

by:

Lab. No.	5-Day B.O.D.	Solids											
		Total	Susp.	Diss.									
F21-82	2-1A-1 Service Water grab 1020 hrs												
F21-83	2-1A-111 Service Water grab 1020 hr ether extractible												
F21-84	2-1A-1V Service Water grab 1020 hr phenols preserved												
F21-85	2-1A-V Service Water grab 1020 hr for C.O.D.												
F21-86	2-2A-1 Finishing Separator Influent comp 930 - 1530 hrs												
F21-87	2-2A-111 Finishing Separator Influent comp 930 - 1530 hrs. ether extractible												
F21-88	2-2A-1V Finishing Separator Influent comp 930-1530 hrs preserved for phenols												
F21-89	2-2A-V Finishing Separator Influent comp 930-1530 hrs C.O.D.												
F21-90	2-3A-1 Finishing Separator Effluent 930 - 1530 hrs												
F21-91	2-3A-111 Finishing Separator Effluent 930 - 1530 hrs ether extractible												
F21-92	2-3A-1V Finishing Separator Effluent 930 - 1530 hrs preserved for phenols												
F21-93	2-3A-V Finishing Separator Effluent 930 - 1530 hrs for C.O.D.												
F21-94	2-4A-1 Reactor Separator Influent 930-1530 hrs												
F21-95	2-4A-111 Reactor Separator Influent 930 - 1530 hrs ether extractible												
F21-96	2-4A-1V Reactor Separator Influent 930 - 1530 hrs preserved for phenols												
F21-97	2-4A-V Reactor Separator Influent 930-1530 hrs for C.O.D.												
F21-98	2-5A-1 Reactor Separator Effluent comp 930 - 1530 hrs												
F21-99	2-5A-111 Reactor Separator Effluent 930-1530 hrs. ether extractibles												
F21-100	2-5A-1V Reactor Separator Effluent 930-1530 hrs preserved for phenols												
F21-101	2-5A-V Reactor Separator Effluent comp 930-1530 hrs for C.O.D.												

~~ONTARIO WATER RESOURCES COMMISSION~~ MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality:

Report to:

c.c.

Source:

Date Sampled:

by:

sb

Lab. No.	5-Day B.O.D. / Solids: Total, Susp., Diss.
T21-102	2-6A-1 API Separator Influent 930-1530 hrs
T21-103	2-6A-111 API Separator Influent 930-1530 hrs ether extractible
T21-104	2-6A-1V API Separator Influent comp 930 1530 hrs preserved for phenols
T21-105	2-6A-V API Separator Influent comp 930-1530 hrs for T.O.N.
T21-106	2-7A-1 API Separator Effluent 930-1530 hrs duplicates
T21-107	2-7A-111 API Separator Effluent comp 930-1530 hrs ether extractible
T21-108	2-7A-1v API Separator Effluent comp 930-1530 hrs preserved for phenols
T21-109	2-7A-V API Separator Effluent comp 930-1530 hrs for T.O.N.
T21-110	2-8A-1 72" Sewer to River 930 - 1530 hrs
T21-111	2-8A-111 72" Sewer to River 930-1530 hrs ether extractible
T21-112	2-8A-1V 72" Sewer to River 930-1530 hrs preserved for phenols
T21-113	2-8A-V 72" Sewer to River 930 - 1530 hrs for T.O.N.
T21-114	2-9A-1 Extraction Tower Effluent grab 1130 hrs
T21-115	2-9A-111 Extraction Tower Effluent grab 1130 hrs ether extractible
T21-116	2-9A-1V Extraction Tower Effluent grab 1130 hrs preserved for phenols
T21-117	2-9A-V Extractopm Tower Effluent grab 1130 hrs for T.O.N.
T21-118	2-10A-1 Refrigeration and Recovery Effluent grab 1045 hrs
T21-119	2-10A-111 Refrigeration and Recovery Effluent grab 1045 hrs ether extractible
T21-120	2-10A-1V Refrigeration and Recovery Effluent grab 1045 hrs preserved for phenols
T21-121	2-10A-V Refrigeration and recovery Effluent grab 1045 hrs for T.O.N.

12-042

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia

Source: Polymer Corporation Limited

Date Sampled: May 28/72 by: R.A.B. & P.L.

Report to:
R.A. Breeze,
555 Exmouth St.,
Sarnia, Ontario.

c.c.

/rd

Lab. No.	5-Day B.O.D.	Solids Total	Solids Susp.	Solids Diss.	pH at Lab.	COD	TOC	T.O.N.	Phenols (ppb)	Ether Solubles		
T22-1	0.8	140	10	130	7.9	< 30	15	---	---	---		
T22-2	---	---	---	---	---	---	---	---	---	trace		
T22-3	---	---	---	---	---	---	---	---	8	---		
T22-4	---	---	---	---	---	---	---	1:8	---	---		
T22-5	44.	450	70	380	8.9	160	25	---	---	---		
T22-6	---	---	---	---	---	---	---	---	---	39		

T22-1	3-1A-I	Service water - Grab 10:25 hrs. - Duplicate.
T22-2	3-1A-111	Service Water - Grab 10:25 hrs. ether extractable
T22-3	3-1A-1V	Service Water - Grab 10:25 hrs - Phenols preserved.
T22-4	3-1A-V	Service Water - Grab 10:25 hrs. for T.O.N.
T22-5	3-2A-I	Finishing Separator Influent - Comp. 9:30 - 15:30 - Duplicate.
T22-6	3-2A-111	Finishing Separator Influent - Comp. 9:30 -15:30 ether extractables.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES
INDUSTRIAL WASTES

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia
Source: Polymer Corporation Limited
Report to: R.A. Breeze,
555 Exmouth Street,
Sarnia, Ontario.
c.c.
/rd
Date Sampled: May 23/72 by: R.A.B. & P.L.

Lab. No.	pH at Lab.	SOLIDS Tot.	Susp.	Diss.	5 Day B.O.D.	C.O.D.	T.O.C.	T.O.N.	Phenols (ppb)	Ether Solubles
T22-7	---	---	---	---	---	---	---	---	80	---
T22-8	---	---	---	---	---	---	---	1:16	---	---
T22-9	9.4	540	40	500	48.	140	20	---	---	---
T22-10	---	---	---	---	---	---	---	---	---	11
T22-11	---	---	---	---	---	---	---	---	30	---
T22-12	---	---	---	---	---	---	---	1:32	---	---
T22-13	7.1	210	40	170	55.	125	37.5	---	---	---

T22-7	3-2A-1V	Finishing Separator Influent - Comp. 9:30 - 15:30 phenols preserved.
T22-8	3-2A-V	Finishing Separator Influent - Grab @ 9:30 for T.O.N.
T22-9	3-3A-I	Finishing Separator Effluent - Comp. 9:30 - 15:30 for T.O.N.
T22-10	3-3A-111	Finishing Separator Effluent - Comp. 9:30 - 15:30 Ether extractables.
T22-11	3-3A-1V	Finishing Separator Effluent - Comp. 9:30 - 15:30 phenols preserved
T22-12	3-3A-V	Finishing Separator Effluent - Grab @ 9:30 for T.O.N.
T22-13	3-4A-I	Reactor Separator Influent - Comp. 9:30 - 15:30

All analyses except pH reported in mg/litre unless otherwise indicated

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES
INDUSTRIAL WASTES

Municipality: Sarnia

Source: Polymer Corporation Limited

Date Sampled: May 28/72 by: R.A.B. & P.L.

Report to:
R.A. Breeze,
555 Exmouth Street,
Sarnia, Ontario.

c.c.

/rd

Lab. No.	pH at Lab.	SOLIDS Tot.	SOLIDS Susp.	SOLIDS Diss.	5 Day B.O.D.	C.O.D.	T.O.C.	T.O.N.	Phenols (ppb)	Ether Solubles			
T22-14	---	---	---	---	---	---	---	---	---	11.			
T22-15	---	---	---	---	---	---	---	---	50	---			
T22-16	---	---	---	---	---	---	---	1:120	---	---			
T22-17	7.0	230	40	190	130	160	23.5	---	---	---			
T22-18	---	---	---	---	---	---	---	---	---	28			
T22-19	---	---	---	---	---	---	---	---	25	---			

T22-14	3-4A-111	Reactor Separator Influent - Comp. 9:30 - 15:30 Ether extractables
T22-15	3-4A-1V	Reactor Separator Influent - Comp. 9:30 - 15:30 Phenols preserved
T22-16	3-4A-V	Reactor Separator Influent - Grab @ 9:30 for T.O.N.
T22-17	3-5A-I	Reactor Separator Effluent - Comp. 9:30 - 15:30 - Duplicate.
T22-18	3-5A-111	Reactor Separator Effluent - Comp. 9:30 - 15:30 - Ether Extractables.
T22-19	3-5A-1V	Reactor Separator Effluent - Comp. 9:30 - 15:30 - Phenols preserved.

MINISTRY OF THE ENVIRONMENT

CHEMICAL ORATORIES

INDUSTRIAL WASTES

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia

Source: Polymer Corporation Limited

Report to:
R.A. Breeze,
555 Exmouth Street,
Sarnia, Ontario.

c.c.

/rd

Date Sampled: May 28/72 R.A.B. & P.L.

Lab. No.	pH at Lab.	SOLIDS Tot.	Susp.	Diss.	B.O.D.	C.O.D.	T.O.C.	T.O.N.	Phenols in ppb	Ether Solubles		
T22-20	---	---	---	---	---	---	---	1:60	---	---		
T22-21	7.3	130	20	110	140	275	207	---	---	---		
T22-22	---	---	---	---	---	---	---	---	---	trace		
T22-23	---	---	---	---	---	---	---	---	30	---		
T22-24	---	---	---	---	---	---	---	1:160	---	---		
T22-25	7.3	100	5	95	70.	230	150	---	---	---		

T22-20	3-5A-	Reactor Separator Effluent - Grab @ 9:30 for T.O.N.
T22-21	3-6A-I	A.P.I. Separator Influent - Comp. 9:30 - 15:30 - Duplicates.
T22-22	3-6A-111	Reactor Separator Effluent - Grab - Comp. 9:30 - 15:30 - Ether Extractables.
T22-23	3-6A-1V	A.P.I. Separator Influent - Comp. 9:30 - 15:30 - Phenols preserved.
T22-24	3-6A-V	A.P.I. Separator Influent - Grab 9:45 for T.O.N.
T22-25	3-7A-I	A.P.I. Separator Effluent - Comp. 9:30 - 15:30 - Duplicates.

MINISTRY OF THE ENVIRONMENT

CHEMICAL . ORATORIES

All analyses except pH reported in
mg/litre unless otherwise indicated

INDUSTRIAL WASTES

Municipality: Sarnia

Source: Polymer Cor. Ltd.

Report to:
R.A. Breeze,
555 Exmouth St.,
Sarnia, Ontario.

c.c.

/rd

Date Sampled: May 28/72 R.A.B. & P.L.

Lab. No.	pH at Lab.	S O L I D S										
		Tot.	Susp.	Diss.	B.O.D.	C.O.D.	T.O.C.	T.O.N.	Phenols (ppb)	Ether Solubles		
T22-26	---	---	---	---	---	---	---	---	---	trace		
T22-27	---	---	---	---	---	---	---	---	30	---		
T22-28	---	---	---	---	---	---	---	1:160	---	---		
T22-29	7.8	190	10	180	5.0	< 30	11	---	---	---		
T22-30	---	---	---	---	---	---	---	---	---	trace		
T22-31	---	---	---	---	---	---	---	---	10	---		
T22-32	---	---	---	---	---	---	---	1:40	---	---		

T22-26 3-7A-111 API Separator Effluent - Comp. 9:30 - 15:30 Ether Extractables.

T22-27 3-7A-1V API Separator Effluent - Comp. 9:30 - 15:30 - Phenols preserved.

T22-28 3-7A-V API Separator Effluent - Grab @ 10:00 for T.O.N.

T22-29 3-8A-I 72" Sewer to River -Comp. 9:30 - 15:30

T22-30 3-8A-111 72' Sewer to River - Comp. 9:30 - 15:30 - Ether Extractables.

T22-31 3-8A-1V 72" Sewer to River - Comp. 9:30 - 15:30 - Phenols preserved.

T22-32 3-8A-V 72" Sewer to River - Grab @ 10:00 for T.O.N.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia

Report to: R.A. Breeze, 555 Exmouth, Sarnia

c.c.

Source: Polymer Corporation Ltd.

Date Sampled: June 6/72 by: R.A.B. & P.L.

mm

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	T.O.N.	Phenols in ppb*	Ether Solubles	pH at Lab	Ether Extractible
		Total	Susp.	Diss.							
T23-49	0.8	140	5	--	< 30	8	--	--	--	8.0	--
T23-50	--	--	--	--	--	--	--	--	< 1	--	--
T23-51	--	--	--	--	--	--	--	2	--	--	--
T23-52	--	--	--	--	--	--	1:40	--	--	--	--
T23-53	320	5200	5	--	940	360	--	--	--	3.9	--
T23-54	--	--	--	--	--	--	--	--	1	--	--
T23-55	--	--	--	--	--	--	--	500	--	--	--
T23-56	550	4810	10	4800	1200	535	--	--	--	3.9	--
T23-57	--	--	--	--	--	--	--	--	--	--	1
T23-58	--	--	--	--	--	--	--	350	--	--	--
T23-59	--	--	--	--	--	--	1:1200	--	--	--	--

* Test performed on preserved sample

T23-49	1-I	6/6-1B-I-G	1130 hrs.
T23-50		6/6-1B-III-G	"
T23-51		6/6-1B-IV-G	"
T23-52		6/6-1B-V-G	"
T23-53		6/6-2B-I-G	1530 hrs.
T23-54		6/6-2B-III-G	"
T23-55		6/6-2B-IV-G	"
T23-56		6/6-3B-I-5C	930-1530 hrs.
T23-57		6/6-3B-III-5C	" "
T23-58		6/6-3B-IV-5C	" "
T23-59		6/6-3B-V-5C	1100 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality:

Report to:

c.c.

Source: Polymer Corporation Ltd.

Date Sampled: June 6/72 by: R.A.B. & P.L.

mm

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	T.O.N.	Phenols in ppb*	Ether Extractible	pH at Lab
		Total	Susp.	Diss.						
T23-60	3600	230	10	220	5300	**	--	--	--	8.8
T23-61	--	--	--	--	--	--	--	--	70	--
T23-62	--	--	--	--	--	--	--	120	--	--
T23-63	480	140	5	135	1850	121	--	--	--	8.6
T23-64	--	--	--	--	--	--	--	--	4	--
T23-65	--	--	--	--	--	--	--	120	--	--
T23-66	--	--	--	--	--	--	1:13000	--	--	--
T23-67	500	160	10	150	1300	150	--	--	--	8.7
T23-68	--	--	--	--	--	--	--	--	9	--
T23-69	--	--	--	--	--	--	--	250	--	--
T23-70	--	--	--	--	--	--	1:8000	--	--	--

** Analysis of this sample not possible by our current method.

* Test performed on preserved sample

T23-60	6/6-4B-I-G	1430 hrs.
T23-61	6/6-4B-III-G	"
T23-62	6/6-4B-IV-G	"
T23-63	6/6-5B-I-5C-	930-1530 hrs.
T23-64	6/6-5B-III-5C	" "
T23-65	6/6-5B-IV-5C	" "
T23-66	6/6-5B-V-G	1015 hrs.
T23-67	6/6-6B-I-5C	930-1530 hrs.
T23-68	6/6-6B-III-5C	" "
T23-69	6/6-6B-IV-5C	" "
T23-70	6/6-6B-V-G	1020 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality:

Report to:

c.c.

Source: Polymer Corporation Ltd.

Date Sampled:S June 6/72 by: R.A.B. & P.L.

mm

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	T.O.N.	Phenols in ppb*	Ether Extractible	pH at Lab			
		Total	Susp.	Diss.									
T23-71	10.	160	5	--	< 30	8	--	--	--	7.5			
T23-72	--	--	--	--	--	--	--	--	< 1	--			
T23-73	--	--	--	--	--	--	--	60	--	--			
T23-74	--	--	--	--	--	--	1:40	--	--	--			
T23-75	6.0	120	5	--	< 30	8.5	--	--	--	7.5			
T23-76	--	--	--	--	--	--	--	--	< 1	--			
T23-77	--	--	--	--	--	--	--	4	--	--			
T23-78	--	--	--	--	--	--	1:40	--	--	--			

* Test performed on preserved sample

T23-71	6/6-7B-I-5C	930-1530 hrs.
T23-72	6/6-7B-III-5C	" "
T23-73	6/6-7B-IV-5C	" "
T23-74	6/6-7B-V-G	1030 hrs.
T23-75	6/6-8B-I-5C	930-1530 hrs.
T23-76	6/6-8B-III-5C	" "
T23-77	6/6-8B-IV-5C	" "
T23-78	6/6-8B-V-G	950 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

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All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia

Report to: R.A. Breeze, 555 Exmouth St., Sarnia

c.c.

Source: Polymer Corp. Ltd.

Date Sampled: June 7/72 by: R.A.B. & P.L.

Lab. No.	pH at Lab ~~5-Day B.O.D.~~	Solids			B.O.D.	C.O.D.	T.O.C.	T.O.N.	Phenols in ppb *	Ether Solubles	Aluminum as Al	Chloride as Cl	mm Sulphides as H_2S
		Total	Susp.	Diss.									
T23-84	7.9	150	5	145	1.0	< 30	10	--	--	--	--	--	--
T23-85	--	--	--	--	--	--	--	--	--	< 1	--	--	--
T23-86	--	--	--	--	--	--	--	--	4	--	--	--	--
T23-87	3.9	13,270	10	13,260	550	1350	37	--	--	--	330	5060	--
T23-88	--	--	--	--	--	--	--	--	--	< 1	--	--	--
T23-89	--	--	--	--	--	--	--	--	500	--	--	--	--
T23-90	--	--	--	--	--	--	--	1:800	--	--	--	--	--
T23-91	9.7	240**	50	190	1200	3,000	526	--	--	--	--< .1	--	<.1
T23-92	--	--	--	--	--	--	--	--	--	5	--	--	--
T23-93	--	--	--	--	--	--	--	--	350	--	--	--	--
T23-94	9.6	200**	30	170	1400	2600	335	--	--	--	--	--	--
T23-95	--	--	--	--	--	--	--	--	--	7	--	--	--

--- * Testperformed on preserved sample. ** Volatile organics present.

T23-84	7/6-1B-I-G	1020 hrs.	
T23-85	7/6-1B-III-G	"	
T23-86	7/6-1B-IV-G	"	
T23-87	7/6-3B-I-G	0940 hrs.	
T23-88	7/6-3B-III-G	"	
T23-89	7/6-3B-IV-G	"	
T23-90	7/6-3B-V-G	"	
T23-91	7/6-5B-I-5C	0930 -	1530 hrs.
T23-92	7/6-5B-III-5C	"	"
T23-93	7/6-5B-IV-5C	"	"
T23-94	7/6-6B-I-5C	"	"
T23-95	7/6-6B-III-5C	"	"

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Report to: c.c.

Source: Polymer

Date Sampled: June 7/72 by: mm

Lab. No.	pH at Lab	Solids			B.O.D.	C.O.D.	T.O.C.	T.O.N.	Phenols in ppb*	Ether Solubles			
		Total	Susp.	Diss.									
T23-96	--	--	--	--	--	--	--	--	400	--			
T23-97	-	--	--	--	--	--	--	1:1000	--	--			
T23-98	7.2	200	20	180	11.	< 30	7	--	--	--			
T23-99	--	--	--	--	--	--	--	--	--	< 1			
T23-100	--	--	--	--	--	--	--	--	120	--			
T23-101	--	--	--	--	--	--	--	1:100	--	--			
T23-102	7.5	150	5	145	4.5	< 30	9	--	--	--			
T23-103	--	--	--	--	--	--	--	--	--	< 1			
T23-104	--	--	--	--	--	--	--	--	4	--			
T23-105	--	--	--	--	--	--	--	1:50	--	--			
T23-106	7.4	140	10	130	1.4	< 30	9	--	--	--			
T23-107	--	--	--	--	--	--	--	--	--	< 1			
T23-108	--	--	--	--	--	--	--	--	8	--			

* Test performed on preserved sample

T23-96	7/6-6B-IV-5C	0930 - 1530 hrs.
T23-97	7/6-6B-V-G	0955 hrs.
T23-98	7/6-7B-I-5C	0930 - 1530 hrs.
T23-99	7/6-7B-III-5C	" "
T23-100	7/6-7B-IV-5C	" "
T23-101	7/6-7B-V-G	1020 hrs.
T23-102	7/6-8B-I-5C	0930 - 1530 hrs.
T23-103	7/6-8B-III-5C	" "
T23-104	7/6-8B-IV-5C	" "
T23-105	7/6-8B-V-G	0950 hrs.
T23-106	7/6-9B-I-5C	0930- 1530 hrs.
T23-107	7/6-9B-III-5C	" "
T23-108	7/6-9B-IV-5C	" "

MINISTRY OF T' ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

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All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia

Report to: R.A. Breeze, 555 Exmouth St., Sarnia

c.c.

Source: Polymer Corp. Ltd.

Date Sampled: June 7/72 by: R.A.B. & P.L.

Lab. No.	pH at Lab	Solids			B.O.D.	C.O.D.	T.O.C.	T.O.N.	Phenols in ppb *	Ether Solubles			
		Total	Susp.	Diss.									
T23-109	--	--	--	--	--	-- -	--	1:10	--	--			
T23-110	8.6	15	< 5	--	9.5	< 30	5	--	--	--			
T23-111	--	--	--	--	--	--	--	--	--	1			
T23-112	--	--	--	--	--	--	--	--	1,200	--			
T23-113	--	--	--	--	--	--	--	1:500	--	--			

* Test performed on preserved sample

T23-109	7/6-9B-V-G	1110 hrs.
T23-110	7/6-10B-I-5C	0930 - 1530 hrs.
T23-111	7/6-10B-III-5C	" "
T23-112	7/6-10B-IV-5C	" "
T23-113	7/6-10B-V-G	1410 hrs.

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MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia Report to: E. Breeze, Sarnia Regional c.c. G. Rees

Source: Polymer Corporation Limited

Date Sampled: June 8/72 by: RB/PL

Lab. No.	5-Day B.O.D.	Solids			Phenols in ppb.	Ether Solubles	Aluminum as Al	Chloride as Cl	COD	TOC	TON	pH at Lab.	
		Total	Susp.	Diss.									
T24-55	1.4	190	5	-	-	-	-	9	< 30	6	-	8.0	
T24-56	-	-	-	-	-	< 1	-	-	-	-	-	-	
T24-57	-	-	-	-	2	-	-	-	-	-	-	-	
T24-58	900	13300	10	-	-	-	960	4470	1030	982	-	3.8	
T24-59	-	-	-	-	-	2	-	-	-	-	-	-	
T24-60	-	-	-	-	500	-	-	-	-	-	-	-	

T24-55	I	1B - I - G	1335 hrs.
T24-56	III	1B - III - G	1335 hrs.
T24-57	IV	1B - IV - G	1335 hrs.
T24-58	3I	3B - I - 5C	0930 hrs. - 1430 hrs.
T24-59	3III	3B - III - 5C	" "
T24-60	3IV	3B - IV - 5C	" "

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MINISTRY OF T[illegible] ENVIRONMENT
CHEMICAL L[illegible]ORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Report to: c.c.

Source:

Date Sampled: June [illegible]/72 by:

Lab. No.	5-Day B.O.D.	Solids			COD	TOC	TOD	Phenols in ppb	Ether Solubles	Total Amines Ethanol	ppm amine	pH at Lab.	
		Total	Susp.	Diss.									
T24-61	-	-	-	-	-	-	1:2000	-	-	-		-	
T24-62	1200	220	15	205	1700	385	-	-	- -	-		5.6	
T24-63	-	-	-	-	-	-	-	-	2	-		-	
T24-64	-	-	-	-	-	-	-	200	- -	-		-	
T24-65	-	180	10	170	1300	**	-	-	- -	22*		[illegible].7	
T24-66	-	-	-	-	-	-	-	-	2	-		-	

* Analysis of sample T24-65 by gas chromatography indicated the presence of ethanolamine. From the GC traces obtained there was no evidence of any higher amines than ethanolamine.

** Exhausted

T24-61	3V	3B - V - G	0950 hrs.
T24-62	5I	5B - I - 5C	0930 - 1430 hrs.
T24-63	5III	5B - III - 5C	"
T24-64	5IV	5B - IV - 5C	"
T24-65	6I	6B - I - 5C	"
T24-66	6III	6B - III - 5C	"

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All analyses except pH reported in mg/litre unless otherwise indicated

MINISTRY OF T' ENVIRONMENT
CHEMICAL L. ORATORIES

INDUSTRIAL WASTE ANALYSIS

Municipality: Report to: c.c.

Source:

Date Sampled: June 8/72 by:

Lab. No.	5-Day B.O.D.	Solids			COD	TOC	TON	Phenols in ppb.	Ether Soluble	pH at Lab.			
		Total	Susp.	Diss.									
T24-67	-	-	-	-	-	-	-	600	-	-			
T24-68	-	-	-	-	-	-	1:500	-	-	-			
T24-69	10.	180	15	165	< 30	8	-	-	-	7.3			
T24-70	-	-	-	-	-	-	-	-	< 1	-			
T24-71	-	-	-	-	-	-	-	60	-	-			
T24-72	-	-	-	-	-	-	1:100	-	-	-			
T24-73	20.	160	5	155	< 30	3	-	-	-	7.4			

T24-57	6IV	6B - IV - 5C	0930 - 1430 hrs.
T24-68	6V	6B - V - G	1005 hrs.
T24-69	7I	7B - I - 5C	0930 - 1430 hrs.
T24-70	7III	7B - III - 5C	"
T24-71	7IV	7B - IV - 5C	"
T24-72	7V	7B - V - G	1015 hrs.
T24-73	8I	8B - I - 5C	0930 - 1430 hrs.

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MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Report to: c.c.

Source:

Date Sampled: June 8/72 by:

Lab. No.	5-Day B.O.D.	Solids			COD	TOC	TON	Phenols in ppb.	Ether Soluble	pH at Lab.			
		Total	Susp.	Diss.									
T24-12	-	-	-	-	-	-	-	-	< 1	-			
T24-13	-	-	-	-	-	-	-	6	-	-			
T24-14	-	-	-	-	-	-	1:50	-	-	-			
T24-15	42.	420	60	360	115	36	-	-	-	7.1			
T24-16	-	-	-	-	-	-	-	-	14	-			
T24-17	-	-	-	-	-	-	-	200	-	-			

T24-12	8III	8B - III - 5C	0930 - 1430 hrs.
T24-13	8IV	8B - IV - 5C	"
T24-14	8V	8B - V - G	1000 hrs.
T24-15	11 I	11B - I - G	1445 hrs.
T24-16	11 III	11B - III - G	1445 hrs.
T24-17	11 IV	11B - IV - G	"

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MINISTRY OF T' ENVIRONMENT
CHEMICAL L. .ORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Report to: c.c.

Source:

Date Sampled: June 8/72 by:

Lab. No.	5-Day B.O.D.	Solids			COD	TOC	TON	Phenols in ppb.	Ether Soluble	pH sat Lab.	Sulphide as H_2S		
		Total	Susp.	Diss.									
T24-74	600	210	5	205	1200	278	-	-	-	5.4	420		
T24-75	-	-	-	-	-	-	-	-	9	-	-		
T24-76	-	-	-	-	-	-	-	20	-	-	-		
T24-77	-	-	-	-	-	-	1:64000	-	-	-	-		

T24-74	12I	12B - 1 - G	1400 hrs.
T24-75	12III	12B - III - G	"
T24-76	12IV	12B - IV - G	"
T24-77	12V	12B - V - G	"

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MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia

Report to: R. Breeze, Sarnia

c.c.

Source: Polymer

Date Sampled: June 21/72 by: RB/PL

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	C.O.D.	T.O.C.	TON	Phenols in ppb.	Ether Solubles			
		Total	Susp.	Diss.									
T26-1	0.8	130	5	125	8.2	< 30	2	-	-	-			
T26-2	-	-	-	-	-	-	-	-	-	< 1			
T26-3	-	-	-	-	-	-	-	-	2	-			
T26-4	-	-	-	-	-	-	-	1:2	-	-			
T26-5	48.	190	40	150	7.1	120	16	-	-	-			
T26-6	-	-	-	-	-	-	-	-	-	14			

T26-1	1 I	21/6	1C - I - G	1340 hrs.
T26-2	I III	21/6	1C -III- G	1340 hrs.
T26-3	I IV	21/6	1C - IV - G	1340 hrs.
T26-4	I V	21/6	1C - V - G	1340 hrs.
T26-5	4 I	21/6	4C - I - 5C	1000 - 1500 hrs.
T26-6	4 III	21/6	4C - III - 5C	1000 - 1500 hrs.

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MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Report to: c.c.

Source:

Date Sampled: June 21/72 by:

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	COD	TOC	TON	Phenols in ppb.	Ether Solubles			
		Total	Susp.	Diss.									
T26-7	-	-	-	-	-	-	-	-	8	-			
T26-8	-	-	-	-	-	-	-	1:8	-	-			
T26-9	120	13510	200	13310	5.7	900	96	-	-	-			
T26-10	-	-	-	-	-	-	-	-	-	49			
T26-11	-	-	-	-	-	-	-	-	1000	-			
T26-12	100	11230	160	11070	6.1	630	82	-	-	-			

T26-7	4 IV	21/6	4C - IV - 5C	1000 - 1500 hrs.
T26-8	4 V	21/6	4C - V - G	1100 hrs.
T26-9	11 I	21/6	11C - I - 5C	1000 - 1500 hrs.
T26-10	11 III	21/6	11C - III - 5C	1000 - 1500 hrs.
T26-11	11 IV	21/6	11C - IV - 5C	1000 - 1500 hrs.
T26-12	14 I	21/6	14C - I - 5C	1000 - 1500 hrs.

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MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Report to: c.c.

Source:

Date Sampled: June 21/72 by:

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	COD	TOC	TON	Phenols in ppb.	Ether Solubles			
		Total	Susp.	Diss.									
T26-13	-	-	-	-	-	-	-	-	-	39			
T26-14	-	-	-	-	-	-	-	-	775	-			
T26-15	-	-	-	-	-	-	-	1:200	-	-			
T26-16	1000	640	210	430	7.2	3500	354	-	-	-			
T26-17	-	-	-	-	-	-	-	-	-	3800			
T26-18	-	-	-	-	-	-	-	-	100	-			
T26-19	-	-	-	-	-	-	-	1:13000	-	-			

T26-13	14 III	21/6	14C - III - 5C	1000 - 1500 hrs.
T26-14	14 IV	21/6	14C - IV - 5C	1000 - 1500 hrs.
T26-15	14 V	21/6	14C - V - G	1015 hrs.
T26-16	15 I	21/6	15C - I - 5C	1000 - 1500 hrs.
T26-17	15 III	21/6	15C - III - 5C	1000 - 1500 hrs.
T26-18	15 IV	21/6	15C - IV - 5C	1000 - 1500 hrs.
T26-19	15 V	21/6	15C - V - G	1100 hrs.

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All analyses except pH reported in mg/litre unless otherwise indicated

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

Municipality:

Report to:

c.c.

Source:

Date Sampled: June 21/72 by:

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	COD	TOC	TON	Phenols in ppb.	Ether Solubles	Alkalinity as $CaCO_3$		
		Total	Susp.	Diss.									
T26-20	240	6430	450	5980	7.4	1010	90	-	-	-	-		
T26-21	-	-	-	-	-	-	-	-	-	94	-		
T26-22	-	-	-	-	-	-	-	-	500	-	-		
T26-23	-	-	-	-	-	-	-	1:800	-	-	-		
T26-24	120	5350	60	5290	6.3	400	85	-	-	-	65		
T26-25	-	-	-	-	-	-	-	-	-	17	-		

T26-20	16I	21/6	16C - I - 5C	1000 - 1500 hrs.
T26-21	16 III	21/6	16C - III - 5C	1000 - 1500 hrs.
T26-22	16 IV	21/6	16C - IV - 5C	1000 - 1500 hrs.
T26-23	16 V	21/6	16C - V - G	1100 hrs.
T26-24	17 I	21/6	17C - I - 5C	1000 - 1500 hrs.
T26-25	17 III	21/6	17C - III - 5C	1000 - 1500 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Report to: c.c.

Source:

Date Sampled: June 21/72 by:

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	COD	TOC	TON	Phenols in ppb.	Ether Solubles			
		Total	Susp.	Diss.									
T26-26	-	-	-	-	-	-	-	-	400	-			
T26-27	-	-	-	-	-	-	-	1:2000	-	-			
T26-28	110	3990	110	3880	2.8	630	113	-	-	-			
T26-29	-	-	-	-	-	-	-	-	-	24			
T26-30	-	-	-	-	-	-	-	-	250	-			

T26-26	17 IV	21/6	17C - IV - 5C	1000 - 1500 hrs.
T26-27	17 V	21/6	17C - V - G	1100 hrs.
T26-28	21 I	21/6	21C - I - G	1300 hrs.
T26-29	21 III	21/6	21C - III - G	1300 hrs.
T26-30	21 IV	21/6	21C - IV - G	1300 hrs.

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MINISTRY OF T' ENVIRONMENT
CHEMICAL L. .ORATORIES

INDUSTRIAL WASTE ANALYSIS

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All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia

Report to: R.A. Breeze, 555 Exmouth St.,
Sarnia, Ont.

c.c.

Source: Polymer Corp. Ltd.

Date Sampled: June 27/72 by: R.A.B. & P.L.

mm

Lab. No.	~~5 Day B.O.D.~~	Solids			pH at Lab	B.O.D.	C.O.D.	T.O.C.	Ether Solubles	Phenols in ppb	T.O.N.		
		Total	Susp.	Diss.									
T26-125		160	20	140	7.8	3.5	20	1	--	--	--		
T26-126		--	--	--	--	--	--	--	--	6	--		
T26-127		180	20	160	7.1	24.	40	4.5	--	--	--		
T26-128		--	--	--	--	--	--	--	1	--	--		
T26-129		--	--	--	--	--	--	--	--	5	--		
T26-130		--	--	--	--	--	--	--	--	--	1:20		
T26-131		8950	330	8620	4.7	90.	680	90	--	--	--		
T26-132		--	--	--	--	--	--	--	136	--	--		
T26-133		--	--	--	--	--	--	--	--	350	--		
T26-134		960	120	840	10.5	460	1250	956	--	--	--		

T26-125	1 I	27/6-1C-I-G	1330 hrs.	
----	1 III	27/6-1C-III-G	"	Broken in transit
T26-126	1 IV	27/6-1C-IV-G	"	
T26-127	4 I	27/6-4C-I-5C	1000-1500 hrs.	
T26-128	4 III	27/6-4C-III-5C	" "	
T36-129	4 IV	27/6-4C-IV-5C	" "	
T26-130	4 V	27/6-4C-V-G	1135 hrs.	
T26-131	11 I	27/6-11C-I-5C	1000-1500 hrs.	
T26-132	11 III	27/6-11C-III-5C	" "	
T26-133	11 IV	27/6-11C-IV-5C	" "	
T26-134	12 I	27/6-12C-I-G	1505 hrs.	

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality:　　Report to:　　c.c.

Source: **Polymer**

Date Sampled: June 27/72　by:

Lab. No.	5-Day B.O.D.	Solids			pH at Lab	C.O.D.	T.O.C.	Ether Solubles	Phenols in ppb	T.O.N.			
		Total	Susp.	Diss.									
T26-135	--	--	--	--	--	--	--	29	--	--			
T26-136	--	--	--	--	--	--	--	--	100	--			
T26-137	130	9160	820	8340	6.9	1300	*	--	--	--			
T26-138	--	--	--	--	--	--	--	136	--	--			
T26-139	--	--	--	--	--	--	--	--	300	--			
T26-140	110	7860	100	7760	8.8	530	84	--	--	--			
T26-141	--	--	--	--	--	--	--	37	--	--			
T26-142	--	--	--	--	--	--	--	--	300	--			
T26-143	--	--	--	--	--	--	--	--	--	1:500			
T26-144	140	1920	90	1830	6.9	375	66	--	--	--			

T26-135	12 III	27/6-12C-III-G	1505 hrs.
T26-136	12 IV	27/6-12C-IV-G	1505 hrs.
T26-137	13 I	27/6-13C-I-5C	1000-1500 hrs.
T26-138	13 III	27/6-13C-III-5C	" "
T36-139	13 IV	27/6-13C-IV-5C	" "
T26-140	14 I	27/6-14C-I-5C	" "
T26-141	14 III	27/6-14C-III-5C	" "
T26-142	14 IV	27/6-14C-IV-5C	" "
T26-143	14 V	27/6-14C-V-G	1000 hrs.
T26-144	15 I	27/6-15C-I-5C	1000-1500 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

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All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Report to: c.c.

Source: Polymer

Date Sampled: June 27/72 by:

mm

Lab. No.	5-Day B.O.D.	Solids Total	Solids Susp.	Solids Diss.	pH at Lab	C.O.D.	T.O.C.	Ether Solubles	Phenols in ppb	T.O.N.			
T26-145	--	--	--	--	--	--	--	30	--	--			
T26-146	--	--	--	--	--	--	--	--	50	--			
T26-147	--	--	--	--	--	--	--	--	--	1:250			
T26-148	90.	5440	140	5300	6.9	375	41	--	--	--			
T26-149	--	--	--	--	--	--	--	31	--	--			
T26-150	--	--	--	--	--	--	--	--	150	--			
T26-151	--	--	--	--	--	--	--	--	--	1:500			
T26-152	80.	4990	80	4910	7.4	275	40	--	--	--			
T26-153	--	--	--	--	--	--	--	26	--	--			
T26-154	--	--	--	--	--	--	--	--	150	--			
T													

T26-145	15III	27/6-15C-III-5C	1000-1500 hrs.
T26-146	15 IV	27/6-15C-IV-5C	" "
T26-147	15 V	27/6-15C-V-G	1015 hrs.
T26-148	16 II	27/6-16C-II-5C	1000-1500 hrs.
T26-149	16 III	27/6-16C-III-5C	" "
T26-150	16 IV	27/6-16C-IV-5C	" "
T26-151	16V	27/6-16C-V-G	1040 hrs.
T26-152	17 I	27/6-17C-I-5C	1000-1500 hrs.
T26-153	17 III	27/6-17C-III-5C	" "
T26-154	17 IV	27/6-17C-IV-5C	" "

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

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INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Report to: c.c.

Source: **Polymer**

Date Sampled: June 27/72 by:

Lab. No.	5-Day B.O.D.	Solids			pH at Lab	C.O.D.	T.O.C.	Ether Solubles	Phenols in ppb	T.O.N.			
		Total	Susp.	Diss.									
T26-155	--	--	--	--	--	--	--	--	--	1:500			
T26-156	60.	260	50	210	7.0	190	30.5	--	--	--			
T26-157	--	--	--	--	--	--	--	16	--	--			
T26-158	--	--	--	--	--	--	--	--	350	--			
T26-159	--	--	--	--	--	--	--	--	--	1:2000			
T26-160	2.0	170	20	150	7.7	25	1.5	--	--	--			
T26-161	--	--	--	--	--	--	--	< 1	--	--			
T26-162	--	--	--	--	--	--	--	--	200	--			
T26-163	--	--	--	--	--	--	--	--	--	1:40			

T26-155	17V	27/6-17C-V-G	1100 hrs.
T26-156	20 I	27/6-20C-I-G	1055 hrs.
T26-157	20 III	27/6-20C-III-G	"
T26-158	20 IV	27/6-20C-IV-G	"
T26-159	20 V	27/6-20C-V-G	"
T26-160	19 I	27/6-19C-I-G	1430 hrs.
T26-161	19 III	27/6-19C-III-G	"
T26-162	19 IV	27/6-19C-IV-G	"
T26-163	19 V	27/6-19C-V-G	"

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

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All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia

Report to: R.A. Breeze, 555 Exmouth St., Sarnia

c.c.

Source: Polymer Corp. Ltd.

Date Sampled: June 28, 72 by: R.A.B. P.L.

Lab. No.	5-Day B.O.D.	Solids			pH at Lab	C.O.D.	T.O.C.	T.O.N.*	Ether Solubles	Phenols in ppb			
		Total	Susp.	Diss.									
T27-58	1.4	150	10	140	7.9	< 30	7	--	--	--			
T27-59	--	--	--	--	--	--	--	--	< 1	--			
T27-60	--	--	--	--	--	--	--	--	--	7			
T27-61	1.8	160	10	150	8.1	< 30	7	--	--	--			
T27-62	--	--	--	--	--	--	--	--	< 1	--			
T27-63	--	--	--	--	--	--	--	--	--	5			

* T.O.N. - Threshold Odour Number

T27-58	1I	28/6 - 1 C-I-G	1450 hrs.'
T27-59	1III	28/6 - 1 C-III-G	"
T27-60	1IV	28/6 - 1 C-IV-G	"
T27-61	5I	28/6 - 5 C-I-G	1350 hrs.
T27-62	5III	28/6 - 5 C-III-G	"
T27-63	5IV	28/6 - 5 C -IV-G	"

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

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All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Report to: c.c.

Source: **Polymer**

Date Sampled: June 28/72 by: mm

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	C.O.D.	T.O.C.	T.O.N.*	Ether Solubles	Phenols in ppb			
		Total	Susp.	Diss.									
T27-64	3.0	150	20	130	8.0	< 30	7	--	--	--			
T27-65	--	--	--	--	--	--	--	--	< 1	--			
T27-66	--	--	--	--	--	--	--	--	--	5			
T27-67	2.5	140	20	120	7.7	< 30	8	--	--	--			
T27-68	--	--	--	--	--	--	--	--	1	--			
T27-69	--	--	--	--	--	--	--	--	--	6			

T27-64	7I	28/6-7C-I-G	1450 hrs.
T27-65	7III	28/6-7C-III-G	"
T27-66	7IV	28/6-7C-IV-G	"
T27-67	8I	28/6-8C-I-5C	1000-1500 hrs.
T27-68	8III	28/6-8C-III-5C	"
T27-69	8IV	28/6-8C-IV-5c	"

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality:
Report to:
c.c.

Source: Polymer

Date Sampled June 28/72 by:

mm

Lab. No.	5-Day B.O.D.	Solids			pH at Lab	C.O.D.	T.O.C.	T.O.N.*	Ether Solubles	Phenols in ppb		
		Total	Susp.	Diss.								
T27-70	--	--	--	--	--	--	--	1:30	--	--		
T27-71	3.0	150	20	130	7.9	< 30	9.0	--	--	--		
T27-72	--	--	--	--	--	--	--	--	2	--		
T27-73	--	--	--	--	--	--	--	--	--	6		
T27-74	--	--	--	--	--	--	--	1:20	--	--		
T27-75	2,800	9750	50	--	10.1	25,500	**	--	--	--		

** Laboratory does not have a satisfactory method for the analysis of this type of sample at present.

T27-70	8V	28/6-8C-V-G 1100 hrs.
T27-71	9II	28/6-9C-II-5C 1000-1500hrs.
T27-72	9III	28/6-9C-III-5C "
T27-73	9IV	28/6-9C-IV-5C "
T27-74	9V	28/6-9C-V-G 1100 hrs.
T27-75	10I	28/6-10C-I-G 1430 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

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All analyses except pH reported in mg/litre unless otherwise indicated

Municipality:

Report to:

c.c.

Source: Polymer

Date Sampled: June 28/72

by:

mm

Lab. No.	5-Day B.O.D.	Solids			pH at Lab	C.O.D.	T.O.C.	T.O.N.*	Ether Solubles	Phenols in ppb	Total Phosphorus as P	Total Kjeldahl as N	
		Total	Susp.	Diss.									
T27-76	--	--	--	--	--	--	--	--	--	200	--	--	
T27-77	140	5440	170	5270	7.1	850	90	--	--	--	2.8	28.	
T27-78	--	--	--	--	--	--	--	--	37	--	--	--	
T27-79	--	--	--	--	--	--	--	--	--	150	--	--	
T27-80	--	--	--	--	--	--	--	1:640	--	--	--	--	
T27-81	100	5760	110	5650	7.0	315	69.5	--	--	--	2.2	28.	

T27-76	10IV	28/6-10C-G	1430 hrs.
T27-77	16I	28/6-16C-I-5C	1000 - 1500 hrs.
T27-78	16III	28/6-16C-III-5C	" "
T27-79	16IV	28/6-16C-IV-5C	" "
T27-80	16V	28/6-16C-V-G	1100 hrs.
T27-81	17I	28/6-17C-I-5C	1000 - 1500 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality:

Report to:

c.c.

Source: **Polymer**

Date Sampled: June 28/72 by:

mm

Lab. No.	5-Day B.O.D.	Solids Total	Solids Susp.	Solids Diss.	pH at Lab	C.O.D.	T.O.C.	T.O.N.*	Ether Solubles	Phenols in ppb		
T27-82	--	--	--	--	--	--	--	--	19	--		
T27-83	--	--	--	--	--	--	--	--	--	250		
T27-84	--	--	--	--	--	--	--	1:1000	--	--		
T27-85	3.0	180	20	160	8.0	< 30	8.5	--	--	--		
T27-86	--	--	--	--	--	--	--	--	< 1	--		
T27-87	--	--	--	--	--	--	--	--	--	4		

T27-82	17III	28/6-17C-III-5C	1000 - 1500 hrs.
T27-83	17IV	28/6-17C-IV-5C	" "
T27-84	17V	28/6-17C-V-G	1050 hrs.
T27-85	18I	28/6-18C-I-G	1335 hrs.
T27-86	18III	28/6-18C-III-G	"
T27-87	18IV	28/6-18C-IV-G	"

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

Page 1 of 3

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia

Report to: R.A. Breeze, 555 Exmouth, Sarnia

c.c.

Source: Polymer Corp. Ltd.

Date Sampled: July 4/72 by: R.A.B. & P.L.

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	pH at Lab	Phenols in ppb	Ether Solubles	T.O.N.			
		Total	Susp.	Diss.									
T27-121	1.6	150	20	130	< 30	5.5	8.0	--	--	--			
T27-122	--	--	--	--	--	--	--	--	< 1	--			
T27-123	--	--	--	--	--	--	--	9	--	--			
T27-124	--	--	--	-	--	--	--	--	--	1:20			
T27-125	2.5	150	10	140	< 30	9.5	84	--	--	--			
T27-126	--	--	--	--	--	--	--	--	2	--			
T27-127	--	--	--	--	--	--	--	18	--	--			
T27-128	--	--	--	--	--	--	--	--	--	1:80			
T27-129	2.0	170	10	160	< 30	9.0	8.0	--	--	--			
T27-130	--	--	--	--	--	--	--	--	2	--			
T27-131	--	--	--	--	--	--	--	8	--	--			

T27-121	II	4/7-1C-I-G	1200 hrs.
T27-122	1 III	4/7-1C-III-G	"
T27-123	1 IV	4/7-1C-IV-G	"
T27-124	1 V	4/7-1C-V-G	"
T27-125	2 I	4/7-2C-I-5C	0930-1430 hrs.
T27-126	2 III	4/7-2C-III-5C	" "
T27-127	2 IV	4/7-2C-IV-5C	" "
T27-128	2V	4/7-2C-V-G	0955 hrs.
T27-129	3 I	4/7-3C-I-5C	0930-1430 hrs.
T27-130	3 III	4/7-3C-III-5C	" "
T27-131	3 IV	4/7-3C-IV-5C	" "

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

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All analyses except pH reported in mg/litre unless otherwise indicated

Municipality:

Report to:

c.c.

Source: Polymer

Date Sampled: July 4/72 by:

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	pH at Lab	Phenols in ppb	Ether Solubles	T.O.N.			
		Total	Susp.	Diss.									
T27-132	--	--	--	--	--	--	--	--	--	1:200			
T27-133	5.0	130	60	70	35	13.0	8.4	--	--	--			
T27-134	--	--	--	--	--	--	--	--	2	--			
T27-135	--	--	--	--	--	--	--	11	--	--			
T27-136	--	--	--	--	--	--	--	--	--	1:500			
T27-137	5.0	160	20	140	< 30	10.0	7.5	--	--	--			
T27-138	--	--	--	--	--	--	--	--	2	--			
T27-139	--	--	--	--	--	--	--	11	--	16			
T27-140	--	--	--	--	--	--	--	--	--	--			
T27-141	2.0	160	10	150	< 30	9.0	8.1	--	--	--			

T27-132	3V	4/7-3C-V-G	1000 hrs.
T27-133	6I	4/7-6C-I-2C	1330 - 1430 hrs.
T27-134	6 III	4/7-6C-III-2C	" "
T27-135	6 IV	4/7-6C-IV-2C	" "
T27-136	6V	4/7-6C-V-G	1400 hrs.
T27-137	8I	4/7-8C-I-5C	0930-1430 hrs.
T27-138	8III	4/7-8C-III-5C	" "
T27-139	8 IV	4/7-8C-IV-5C	" "
T27-140	8V	4/7-8C-V-G	1050 hrs.
T27-141	9I	4/7-9C-I-5C	0930-1430 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

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Municipality:

Report to:

c.c.

Source: Polymer

Date Sampled: July 4/72 by: mm

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	ph at Lab	Phenols inppb	Ether Solubles	T.O.N.			
		Total	Susp.	Diss.									
T27-142	--	--	--	--	--	--	--	--	2	--			
T27-143	--	--	--	--	--	--	--	6	--	--			
T27-144	--	--	--	--	--	--	--	--	--	1:16			
T27-145	18.	170	50	120	40	*	8.6	--	--	--			
T27-146	--	--	--	--	--	--	--	--	2	--			
T27-147	--	--	--	--	--	--	--	8	--	--			
T27-148	--	--	--	--	--	--	--	--	--	1:20			

T27-142	9III	4/7-9C-III-5C	0930-1430 hrs.
T27-143	9IV	4/7-9C-IV-5C	" "
T27-144	9V	4/7-9C-V-G	1020 hrs.
T27-145	22I	4/7-22C-I-5C	0930-1430 hrs.
T27-146	22III	4/7-22C-III-5C	0930-1430 hrs.
T27-147	22IV	4/7-22C-IV-5C	" "
T27-148	22V	4/7-22C-V-G	1005 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

Page 1 of 3

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia
Report to: R.A. Breeze, 555 Exmouth St., Sarnia c.c.

Source: Polymer Corp. Ltd.

Date Sampled: July 5/72 by: R.A.B./P.L.

mm

Lab. No.	5-Day B.O.D.	Solids			pH at Lab	~~[illegible]~~	C.O.D.	T.O.C.	Ether Solubles	Phenols in ppb	T.O.N.	NITROGEN AS N	
		Total	Susp.	Diss.								Free Ammonia	Total Kjeldahl
T28-35	2.5	150	10	140	7.8		< 30	4	--	--	--	.04	1.0
T28-36	--	--	----	--	--		--	--	< 1	--	--	--	--
T28-37	--	--	--	--	--		--	--	--	4	--	--	--
T28-38	6.5	160	40	120	9.8		< 30	7	--	--	--	31.	42.
T28-39	--	--	--	--	--		--	--	6	--	--	--	--
T28-40	--	--	--	--	--		--	--	--	10	--	--	--

T28-35	1I	5/7-1C-I-G	1040 hrs.	
T28-36	1 III	5/7-1C-III-G	"	
T28-37	1 IV	5/7-1C-1V-G	"	
T28-38	2 I	5/7-2C-I-5C	0930-1430 hrs.'	
T28-39	2 III	5/7-2C-III-5C	"	"
T28-40	2 IV	5/7-IV-5C 2C-	"	"

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MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

Page 2 of 3

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia

Report to:

c.c.

Source: Polymer Corpn. Ltd.

Date Sampled: July 5/72 by:

mm

Lab. No.	5-Day B.O.D.	Solids			pH at Lab	C.O.D.	T.O.C.	Ether Solubles	Phenols in ppb	T.O.N.	NITROGEN AS N	
		Total	Susp.	Diss.							Free Ammonia	Total Kjeldahl
T28-41	--	-- -	--	--	--	--	--	--	--	1:200	--	--
T28-42	5.0	160	10	150	7.6	< 30	8	--	--	--	.07	1.0
T28-43	--	--	--	--	--	--	--	3	--	--	--	--
T28-44	--	--	--	--	--	--	--	--	4	--	--	--
T28-45	--	--	--	--	--	--	--	--	--	1:25	--	--
T28-46	11.	140	30	110	8.5	45	11	--	--	--	--	--
T28-47	--	--	--	--	--	--	--	2	--	--	--	--
T28-48	--	--	--	--	--	--	--	--	12	--	--	--
T28-49	--	--	--	--	--	--	--	--	--	1:200	--	--
T28-50	6.0	180	30	150	8.9	< 30	5	--	--	--	--	--
T28-51	--	--	--	--	--	--	--	4	--	--	--	--

T28-41	2V	5/7-2C-V-G	0930 hrs.
T28-42	3I	5/7-3C-I-5C	0930 hrs. - 1430 hrs.
T28-43	3III	5/7-3C-III-5C	" "
T28-44	3IV	5/7-3C-IV-5C	" "
T28-45	3V	5/7-3C-V-G	1015 hrs.
T28-46	6I	5/7-6C-I-5C	0930-1430 hrs.
T28-47	6III	5/7-6C-III-5C	" "
T28-48	6IV	5/7-6C-IV-5C	" "
T28-49	6V	5/7-6C-V-G	1000 hrs.
T28-50	22I	5/7-22C-I-G	"
T28-51	22III	5/722C -III-G	"

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

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Municipality: Sarnia

Report to:

c.c.

Source: Polymer Corpn. Ltd.

Date Sampled: July 5/72 by:

Lab. No.	5-Day B.O.D.	Solids			pH at Lab	C.O.D.	T.O.C.	Ether Solubles	Phenols in ppb	T.O.N.			
		Total	Susp.	Diss.									
T28-52	--	--	--	--	--	--	--	--	6	--			
T28-54	850	120	5	--	9.1	2,300	730	--	--	--			
T28-55	850	120	5	--	9.2	2,700	850	--	--	--			
T28-56	--	--	--	--	--	--	--	8	--	--			
T28-57	--	--	--	--	--	--	--	--	950	--			

T28-52	22IV	5/7-22C-IV-G	1000 hrs.
T28-54	A	5/7-6B-I-G	1335 hrs.
T28-55	B	5/7-6B-II-G	"
T28-56	C	5/7-6B-III-G	"
T28-57	D	5/7-6B-IV-G	"

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MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia   Report to: R. Breeze, Sarnia Regional   c.c.

Source: Polymer Corporation Ltd.

Date Sampled: July 18/72   by: RB/PL

Lab. No.	5-Day B.O.D.	Solids			Phenols in ppb.	Ether Solubles	Nitrogen as N		C.O.D.	T.O.C.	pH at Lab.		
		Total	Susp.	Diss.			Free Ammonia	Total Kjeldahl					
T29-54	0.4	170	5	165	-	-	.2	.2	< 30	11	8.1		
T29-55	-	-	-	-	-	1	-	-	-	-	-		
T29-56	-	-	-	-	15	-	-	-	-	-	-		
T29-57	0.2	150	5	145	-	-	-	-	< 30	2	7.9		
T29-58	-	-	-	-	-	< 1	-	-	-	-	-		
T29-59	-	-	-	-	12	-	-	-	-	-	-		

T29-54	1 I	1D I	G 1400 hrs.
T29-55	1 III	1D III	G 1400 hrs.
T29-56	1 IV	1D IV	G 1400 hrs.
T29-57	2 I	2D I	G 1020 hrs.
T29-58	2 III	2D III	G 1020 hrs.
T29-59	2 IV	2D IV	G 1020 hrs.

All analyses except pH reported in mg/litre unless otherwise indicated

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

Municipality: Report to: c.c.

Source:

Date Sampled: July 18/72 by: RB/PL

Lab. No.	5-Day B.O.D.	Solids			Phenols in ppb.	Ether Solubles	Nitrogen as N		C.O.D.	T.O.C.	pH at Lab.		
		Total	Susp.	Diss.			Free Ammonia	Total Kjeldahl					
T29-60	0.4	60	5	55	-	-	-	-	< 30	3	7.6		
T29-61	-	-	-	-	-	1	-	-	-	-	-		
T29-62	-	-	-	-	8	-	-	-	-	-	-		
T29-63	34.	60	10	50	-	-	-	-	100	34	6.6		
T29-64	-	-	-	-	-	9	-	-	-	-	-		
T29-65	-	-	-	-		-	-	-	-	-	-		

T29-60	3 I	3D	I	G 1030 hrs.
T29-61	3 III	3D	III	G 1030 hrs.
T29-62	3 IV	3D	IV	G 1030 hrs.
T29-63	4 I	4D	I	G 1025 hrs.
T29-64	4 III	4D	III	G 1025 hrs.
T29-65	4 IV	4D	IV	G 1025 hrs.

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MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Report to: c.c.

Source:

Date Sampled: July 18/72 by: b

Lab. No.	5-Day B.O.D.	Solids			Phenols in ppb.	Ether Solubles	Nitrogen as N		C.O.D.	T.O.C.	pH at Lab.	Copper as Cu	
		Total	Susp.	Diss.			Free Ammonia	Total Kjeldahl					
T29-66	0.8	120	5	115	-	-	3.6	5.0	< 30	6	8.9	-	
T29-67	-	-	-	-	-	5	-	-	-	-	-	-	
T29-68	-	-	-	-	4	-	-	-	-	-	-	-	
T29-69	26.	180	90	90	-	-	4300.	5000.	580	440	11.0	1.8	
T29-70	-	-	-	-	-	12	-	-	-	-	-	-	
T29-71	-	-	-	-	20	-	-	-	-	-	-	-	

T29-66	5I	5D	I	C	0930 - 1430
T29-67	5III	5D	III	C	0930 - 1430
T29-68	5IV	5D	IV	C	0930 - 1430
T29-69	6I	6D	I	C	0930 - 1430
T29-70	6III	6D	III	C	0930 - 1430
T29-71	6IV	6D	IV	C	0930 - 1430

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All analyses except pH reported in
mg/litre unless otherwise indicated

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

Municipality:

Report to:

c.c.

Source:

Date Sampled: July 18/72 by:

b

Lab. No.	5-Day B.O.D.	Solids			Phenols in ppb.	Ether Solubles	NITROGEN AS N		C.O.D.	T.O.C.	pH at Lab.	TON	
		Total	Susp.	Diss.			Free Ammonia	Total Kjeldahl					
T29-72	8.0	140	50	90	-	-	690.	700.	70	56	10.5	-	
T29-73	-	-	-	-	-	7	-	-	-	-	-	-	
T29-74	-	-	-	-	6	-	-	-	-	-	-	-	
T29-75	-	-	-	-	-	-	-	-	-	-	-		
T29-76	40.	160	50	110	-	-	.8	11.	170	57	7.4	-	
T29-77	-	-	-	-	-	140	-	-	-	-	-	-	

T29-72	7I	7D	I	C	0930 - 1430 hrs.
T29-73	7III	7D	III	C	0930 - 1430 hrs.
T29-74	7IV	7D	IV	C	0930 - 1430 hrs.
T29-75	7V	7D	V	G	0945 hrs.
T29-76	8I	8D	I	C	0930 - 1430 hrs.
T29-77	8III	8D	III	C	0930 - 1430 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality:

Report to:

c.c.

Source:

Date Sampled: July 18/72 by: RAB/PL

Lab. No.	5-Day B.O.D.	Solids			Phenols in ppb.	Ether Solubles	Nitrogen as N		Copper as Cu	C.O.D.	T.O.C.	pH at Lab.
		Total	Susp.	Diss.			Free Ammonia	Total Kjeldahl				
T29-78	-	-	-	-	60	-	-	-	-	-	-	-
T29-79	130	170	60	110	-	-	150.	180.	-	510	132	10.0
T29-80	-	-	-	-	-	75	-	-	-	-	-	-
T29-81	-	-	-	-	600	-	-	-	-	-	-	-
T29-82	130	180	40	140	-	-	180.	220.	.25	420	170	10.1
T29-83	-	-	-	-	-	120	-	-	-	-	-	-

T29-78	8IV	8D	IV	C	0930 - 1430 hrs.
T29-79	9I	9D	I	C	0930 - 1430 hrs.
T29-80	9III	9D	III	C	0930 - 1430 hrs.
T29-81	9IV	9D	IV	C	0930 - 1430 hrs.
T29-82	10I	10D	I	C	0930 - 1430 hrs.
T29-83	10III	10D	III	C	0930 - 1430 hrs.

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All analyses except pH reported in
mg/litre unless otherwise indicated

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

Municipality: Report to: c.c.

Source:

Date Sampled: **July 18/72** by: **RB/PL**

Lab. No.	5-Day B.O.D.	Solids			Phenols in ppb.	Ether Solubles	Nitrogen as N		Copper as Cu	C.O.D.	T.O.C.	pH	TON
		Total	Susp.	Diss.			Free Ammonia	Total Kjeldahl					
T29-84	-	-	-	-	600	-	-	-	-	-	-	-	-
T29-85	-	-	-	-	-	-	-	-	-	-	-	-	1:20000

T29-84 10IV 10D C 0930 - 1430 hrs.
T29-85 10V 10D G 1005 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia Report to: R. Breeze, Sarnia c.c.

Source: Polymer Corp. Ltd.

Date Sampled: July 19/72 by: RB/PL

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	pH at Lab.						
		Total	Susp.	Diss.									
T30-20	1.4	120	5	115	< 30	9	7.9						
T30-21	24.	20	0	20	90	35	5.9						
T30-22	1.8	130	5	125	< 30	11	9.4						
T30-23	15.	110	60	50	405	160	11.1						
T30-24	8.0	90	30	60	40	18	10.3						
T30-25	500	120	20	100	770	89	7.0						
T30-26	320 **	*	*	*	2200	*	10.0						
T30-27	300	*	*	*	255000	*	9.9						

** Aqueous layer only

* These samples are not suitable for TOC measurements.- thick oil layer cannto be sampled by a microsyringe.

T30-20	1 I	1 D	I - G	1040 hrs.
T30-21	4 I	4 D	I - G	1060 hrs.
T30-22	5 I	5 D	I - 5C	0900 - 1400 hrs.
T30-23	6 I	6 D	I - 5C	"
T30-24	7 I	7 D	I - 5C	"
T30-25	8 I	8 D	I - 5C	"
T30-26	9 I	9 D	I - 5C	"
T30-27	10 I	10 D	I - 5C	"

All analyses except pH reported in mg/litre unless otherwise indicated

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

Municipality: Report to: c.c.

Source:

Date Sampled: July 19/72 by: RB/PL

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	pH at Lab.						
		Total	Susp.	Diss.									
T30-28	500	680	0	680	1050	830	10.2						
T30-29	50.	60	5	55	285	220	7.2						

T30-28	15 I	15 D	I - 5C	0900 - 1400 hrs.
T30-29	20 I	20 D	I - G	1430 hrs.

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MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality:

Report to:

c.c.

Source:

Date Sampled: July 19/72 by: RB/PL

Lab. No.	5-Day B.O.D.	Solids			Ether Solubles
		Total	Susp.	Diss.	
T30-30					1
T30-31					140
T30-32					6
T30-33					7
T30-34					8
T30-35					7
T30-36					710
T30-37					18% v/v
T30-38					23
T30-39					18

T30-30	1 III	1D	III - G	1040 hrs.
T30-31	4 III	4D	III - G	1050 hrs.
T30-32	5 III	5D	III - 5C	0900 - 1400 hrs.
T30-33	6 III	6D	III - 5C	"
T30-34	7 III	7D	III - 5C	"
T30-35	8 III	8D	III - 5C	"
T30-36	9 III	9D	III - 5C	"
T30-37	10 III	10D	III~~/~~ - 5C	"
T30-38	15 III	15D	III - 5C	"
T30-39	20 III	20D	III - G	1430 hrs.

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All analyses except pH reported in
mg/litre unless otherwise indicated

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

Municipality:

Report to:

c.c.

Source:

Date Sampled: July 19/72 by: RB/PL

Lab. No.	5-Day B.O.D.	Solids			ppb Phenols									
		Total	Susp.	Diss.										
T30-40					4									
T30-41					4									
T30-42					4									
T30-43					20									
T30-44					8									
T30-45					100									
T30-46					500									
T30-47					600									
T30-48					500									
T30-49					*									
~~[illegible]~~														

* Not suitable for analysis - colour interference- All samples preserved with $CuSO_4$

T30-40	1 IV	1D	IV - G	1040 hrs.
T30-41	4 IV	4D	IV - G	1050 hrs.
T30-42	5 IV	5D	IV - 5C	0900 - 1400 hrs.
T30-43	6 IV	6D	IV - 5C	"
T30-44	7 IV	7D	IV - 5C	"
T30-45	8 IV	8D	IV - 5C	"
T30-46	9 IV	9D	IV - 5C	"
T30-47	10 IV	10D	IV - 5C	"
T30-48	15 IV	15D	IV - 5C	"
T30-49	20 IV	20D	IV - G	1430 hrs.

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All analyses except pH reported in mg/litre unless otherwise indicated

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

Municipality: Report to: c.c.

Source:

Date Sampled: July 19/72 by: RB/PL

Lab. No.	5-Day B.O.D.	Solids			T.O.N.								
		Total	Susp.	Diss.									
T30-50					*								
T30-51					1:3200								

* Accidentally discarded at laboratory

T30-50	7 V	7D	V - G	0935 hrs.
T30-51	10V	XMX	10D - V - G	1000 hrs.

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MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

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All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia

Report to: R.A. Preeze, 555 Exmouth St., Sarnia

c.c.

Source: Polymer Corporation Ltd.

Date Sampled: July 20/72 by: R.A.B. P.L.

mm

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	pH at Lab						
		Total	Susp.	Diss.									
T30-52	3.0	130	5	125	< 30	13	8.2						
T30-53	85.	140	40	100	295	124	10.2						
T30-54	260	100	10	90	11,500	23,800	7.9						
T30-55	300	130	10	120	1,250	1,150	9.8						
T30-56	70.	90	10	80	1,550	1090	7.7						
T30-57	95.	90	5	85	1,190	930	10.4						
T30-58	110	920	5	915	1,150	970	10.4						
T30-59	110	910	5	905	1,050	890	10.3						

T30-52	1I	20/7-1D-I-G	1400 hrs.	
T30-53	10I	20/7-10D-I-5C	0930-1430	Hrs.
T30-54	11II	20/7-11D-II-5C	"	"
T30-55	12I	20/7-12D-I-5C	"	"
T30-56	13I	20/7-13D-I-5C	"	"
T30-57	14I	20/7-14D-I-5C	"	"
T30-58	15I	20/7-15D-I-5C	"	"
T30-59	21I	20/7-21D-I-5C	"	"

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality:

Report to:

c.c.

Source: **Polymer**

Date Sampled: July 20/72 by: R.A.B. P.L.

mm

Lab. No.	5-Day B.O.D.	Solids											
		Total	Susp.	Diss.									
	Ether Solubles												
T30-60	1												
T30-61	98												
T30-62	100												
T30-63	68												
T30-64	62												
T30-65	5												
T30-66	26												
T30-67	22												

T30-60	1 III	20/7-1D-III-G	1400 hrs.
T30-61	10 III	20/7-10D-III-5C	0930-1430 hrs.
T30-62	11 III	20/7-11D-III-5C	"
T30-63	12 III	20/7-12D-III-5C	"
T30-64	13 III	20/7-13D-III-5C	"
T30-65	14 III	20/7-14D-III-5C	"
T30-66	15 III	20/7-15D-III-5C	"
T30-67	21 III	20/7-21D-III-5C	"

All analyses except pH reported in mg/litre unless otherwise indicated

MINISTRY OF THE ENVIRONMENT

CHEMICAL LABORATORIES

INDUSTRIAL WASTES ANALYSIS

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Municipality:

Report to:

c.c.

Source: Polymer

Date Sampled: July 20/72 by R.A.B. P.L.

mm

Lab. No.	Phenols in ppb	T.O.N.
T30-68	4	--
T30-69	500	--
T30-70	4000	--
T30-71	4000	--
T30-72	7500	--
T30-73	6000	--
T30-74	300	--
T30-75	550	--
T30-76	--	1:1.7x109
T30-77	--	1:20,000

T30-68	1 IV	20/7-1D-IV-G	1400 hrs.
T30-69	10 IV	20/7-10D-IV-5C	0930-1430 hrs.
T30-70	11 IV	20/7-11D-IV-5C	"
T30-71	12 IV	20/7-12D-IV-5C	"
T30-72	13 IV	20/7-13D-IV-5C	"
T30-73	14 IV	20/7-14D-IV-5C	
T30-74	15 IV	20/7-15D-IV-5C	"
T30-75	21 IV	20/7-21D-IV-5C	"
T30-76	10 V	20/7-10D-V-G	1030 hrs.
T30-77	15 V	20/7-15D-V-G	1005 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

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All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia

Report to: R.A. Breeze, 555 Exmouth St., Sarnia c.c.

Source: POlymer Corp. Ltd.

Date Sampled: Aug. 24/72 by: R.A.B. P.L.

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	pH at Lab
		Total	Susp.	Diss.			
T35-24	1.4	150	5	145	< 30	4	8.2
T35-25	4,400	110	10	100	16,500	*	7.3
T35-26	360	130	10	120	2,000	*	9.6
T35-27	450	60	5	55	1,950	*	6.4
T35-28	500	40	0	40	1,130	*	6.4
T35-29	460	390	5	385	1,190	*	9.1
T35-30	1.0	140	5	135	< 30	3	8.3
T35-31	18.	140	5	135	40	16	8.1
T35-32	0.8	130	5	125	< 30	3	8.3
T35-33	0.6	130	5	125	< 30	3	8.5
T35-34	1200	10	0	10	6,100	*	4.6
T35-35	900	20	0	20	2450	*	4.5

* These samples are not suitable for T.O.C. measurements

T35-24	1I	24/8-1D-I-G	1330 hrs.
T35-25	11 I	24/8-11D-I-5C	0900-1400 hrs.
T35-26	12I	24/8-12D-I-5C	"
T35-27	13 I	24/8-13D-I-5C	"
T35-28	14 I	24/8-14D-I-5C	0900-1500 hrs.
T35-29	15I	24/8-15D-I-5C	"
T35-30	16 I	24/8-16D-I-G	1130 hrs.
T35-31	17 I	24/8-17D-I-5C	0900-1500 hrs.
T35-32	18 I	24/8-18D-I-G	1100 hrs.
T35-33	19 I	24/8-19D-I-G	"
T35-34	22I	24/8-22D-I-G	1320 hrs.
T35-35	23I	24/8-23D-I-G	1330 hrs.

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All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Report to: c.c.

Source: Polymer

Date Sampled: Aug. 24/72 by: mm

Lab. No.	Ether Solubles
T35-36	< 1
T35-37	180
T35-38	190
T35-39	150
T35-40	12
T35-41	16
T35-42	< 1
T35-43	< 1
T35-44	< 1
T35-45	< 1
T35-46	2100
T35-47	160

T35-36	1 III	24/8-1D-III-G	1330 hrs.	(One Gallon sample)
T35-37	11 III	24/8-11D-III-5C	0900-1400 hrs.	
T35-38	12 III	24/8-12D-III-5C	"	
T35-39	13 III	24/8-13D-III-5C	"	
T35-40	14 III	24/8-14D-III-5C	"	
T35-41	15 III	24/8-15D-III-5C	"	
T35-42	16 III	24/8-16D-III-G	1130 hrs.	
T35-43	17 III	24/8-17D-III-5C	0900-1400 hrs.	
T35-44	18 III	24/8-18D-III-G	1100 hrs.	
T35-45	19 III	24/8-19D-III-G	1100 hrs.	
T35-46	22 III	24/8-22D-III-G	1320 hrs.	
T35-47	23 III	24/8-23D-III-G	1330 hrs.	

MINISTRY OF THE ENVIRONMENT

CHEMICAL L. ORATORIES

INDUSTRIAL WASTES ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

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Municipality:

Report to:

c.c.

Source: Polymer

Date Sampled: Aug. 24/72 by:

Lab. No.	Phenols in ppb
T35-48	6
T35-49	7,000
T35-50	7,000
T35-51	10,000
T35-52	12,500
T35-53	600
T35-54	10
T35-55	45
T35-56	8
T35-57	4
T35-58	7,750
T35-59	12,500

T35-48	1 IV	24/8-1D-IV-G	1330 hrs.
T35-49	11 IV	24/8-11D-IV-5C	0900-1400 hrs.
T35-30	12 IV	24/8-12D-IV-5C	"
T35-51	13 IV	24/8-13D-IV-5C	"
T35-52	14 IV	24/8-14D-IV-5C	"
T35-53	15 IV	24/8-15D-IV-5C	"
T35-54	16 IV	24/8-16D-IV-G	1130 hrs.
T35-55	17 IV	24/8-17D-IV-5C	0900-1400 hrs.
T35-56	18 IV	24/8-18D-IV-G	1100 hrs.
T35-57	19 IV	24/8-19D-IV-G	"
T35-58	22 IV	24/8-22D-IV-G	1320 hrs.
T35-59	23 IV	24/8-$\overset{2}{3}$D-IV-G	1330 hrs.

MINISTRY OF THE ENVIRONMENT Page 4 of 4

CHEMICAL L ORATORIES

INDUSTRIAL WASTES ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality:

Report to:

c.c.

Source: Polymer

Date Sampled: Aug. 24/72 by:

Lab. No.	Threshold Odour
T35-60	1:41x10^{6}
T35-61	1:25000
T35-62	1:1.6x10^{8}
T35-63	1:50,000
T35-64	1:1.6x10^{6}
T35-65	1:500

T35-60	11 V	24/8-11D-V-G	1015 hrs.
T35-61	12 V	24.8-12D-V-G	1130 hrs.
T35-62	13 V	24/8-13D-V-G	0940 hrs.
T35-63	14 V	24/8-14D-V-G	1020 hrs.
T35-64	15 V	24/8-15D-V-G	0930 hrs.
T35-65	17 V	24/8-17D-V-G	0955 hrs.

MINISTRY OF T' ENVIRONMENT
CHEMICAL L. .ORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: **Sarnia** Report to: **R. Breeze, Sarnia** c.c.

Source: **Polymer Corp. Ltd.**

Date Sampled: **Aug. 28/72** by: **RB/PL**

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	pH at Lab.	Copper as Cu	Nickel as Ni	Lead as Pb			
		Total	Susp.	Diss.									
T35-74	0.2	130	5	125	< 30	5	7.8	-	-	-			
T35-75	42.	***	10	-	360	3600 *	1.0	-	-	-			
T35-76	50.	200	40	-	295	2130 *	10.0	-	-	-			
T35-77	34.	190	20	170	205	1830 *	9.1	-	-	-			
T35-78	55.	620	170	450	860	1900 *	11.2	-	-	-			
T35-79	1.8	140	5	135	< 30	12	7.9	-	-	-			
T35-80	24.	1670	220	1450	40	20	11.9	-	-	-			
T35-81	**	180	60	120	375	84	8.0	-	-	-			
T35-82	70.	1280	50	1230	2000	890 *	8.0	-	-	-			

* Total carbon
** Interference

T35-74	1 I	1F - I - G	1100 hrs.
T35-75	2 I	2F - I - 5C	0900 - 1400 hrs.
T35-76	3 I	3F - I - 5C	"
T35-77	4 I	4F - I - 5C	"
T35-78	5 I	5F - I - G	0915 hrs.
T35-79	6 I	6F - I - 5C	0900 - 1400 hrs.
T35-80	7 I	7F - I - 5C	"
T35-81	8 I	8F - I - 5C	"

T35-82 ---- 9 I 9F - I - G - 1350 hrs.

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All analyses except pH reported in mg/litre unless otherwise indicated

MINISTRY OF T' ENVIRONMENT
CHEMICAL L. ORATORIES

INDUSTRIAL WASTE ANALYSIS

Municipality: Report to: c.c.

Source:

Date Sampled: **Aug.** 28/72 by:

Lab. No.	5-Day B.O.D.	Solids			Ether Solubles								
		Total	Susp.	Diss.									
T35-83					< 1								
T35-84					3								
T35-85					< 1								
T35-86					< 1								
T35-87					25								
T35-88					< 1								
T35-89					3								
T35-90					< 3								
T35-91					4								

T35-83	1 III	1F - III - G	1100 hrs.
T35-84	2 III	2F - III - 5C	0900 - 1400 hrs.
T35-85	3 III	3F - III - 5C	"
T35-86	4 III	4F - III - 5C	"
T35-87	5 III	5F - III - G	0915 hrs.
T35-88	6 III	6F - III - 5C	0900 - 1400 hrs.
T35-89	7 III	7F - III - 5C	"
T35-90	8 III	8F - III - 5C	"
T35-91	9 III	9F - III - G	1350 hrs.

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MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality:

Report to:

c.c.

Source:

Date Sampled: Aug. 28/72 by:

Lab. No.	5-Day B.O.D.	Solids			Phenols ppb.								
		Total	Susp.	Diss.									
T35-92					10								
T35-93					0								
T35-94					0								
T35-95					0								
T35-96					40								
T35-97					10								
T35-98					40								
T35-99					8								
T35-100					60								

T35-92	1 IV	1F - IV - G	1100 hrs.	preserved with $CuSO_4$
T35-93	2 IV	2F - IV - 5C	0900 - 1400 hrs.	"
T35-94	3 IV	3F - IV - 5C	"	"
T35-95	4 IV	4F - IV - 5C	"	"
T35-96	5 IV	5F - IV - G	0915 hrs.	"
T35-97	6 IV	6F - IV - 5C	0900 - 1400 hrs.	"
T35-98	7 IV	7F - IV - 5C	"	"
T35-99	8 IV	8F - IV - 5C	"	"
T35-100	9 IV	9F - IV - G	1350 hrs.	

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MINISTRY OF T ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Report to: c.c.

Source:

Date Sampled: Aug. 28/72 by:

Lab. No.	5-Day B.O.D.	Solids			Threshold Odour								
		Total	Susp.	Diss.									
T35-101					1:500								
T35-102					1:20								
T35-103					1:640								

T35-101	4V	4F - V - G	0930 hrs.
T35-102	6V	6F - V - G	0955 hrs.
T35-103	8V	8F - V - G	1015 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia

Report to: R.A. Breeze, 555 Exmouth St., Sarnia. c.c.

Source: **Polymer Corp. Ltd.**

Date Sampled: Aug. 29/72 by: R.A.B. & P.L.

mm

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	pH at Lab						
		Total	Susp.	Diss.									
T35-137	0.8	130	5	125	< 30	9	8.2						
T35-138	55.	**	10	--	27000	5050*	1.3						
T35-139	38.	480	5	475	630	183	1.9						
T35-140	38.	440	30	410	950	320	2.9						

** Oily, did not dry.
* Total Carbon

T35-137	1I	29/8-1F-I-C	1015 hrs.
T35-138	2I	29/7-2F-I-5C	0900-1400 hrs.
T35-139	3I	29/8-3F-I-5C	" "
T35-140	4I	29/8-4F-I-5C	" "

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality:

Report to: R. Breeze, Sarnia, Ont.

c.c.

Source: Polymer

Date Sampled: Aug. 29/72 by:

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	pH at Lab.	Total Phosphorus as P	Total Sulphur as S				
		Total	Susp.	Diss.									
T35-141	0.8	150	5	145	< 30	9	8.2	-	-				
T35-142	13.	1480	150	1330	30	21	11.7	30.	40.				
T35-143	5.0	220	5	215	400	108	7.8	.5	19.				
T35-144	80.	50	0	50	5000	1050 *	8.3	-	-				

* Total carbon

T35-141	6 I	6F - I - 5C	0900 - 1400 hrs.
T35-142	7 I	7F - I - 5C	0900 - 1400 hrs.
T35-143	8 I	8F - I - 5C	0900 - 1400 hrs.
T35-144	9 I	9F - I - G	1030 hrs.

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MINISTRY OF THE ENVIRONMENT

CHEMICAL LABORATORIES

INDUSTRIAL WASTES ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality:

Report to:

c.c.

Source: Polymer

Date Sampled: Aug. 29/72 by:

Lab. No.	Ether Solubles													
T35-145	< 1													
T35-146	3													
T35-147	< 1													
T35-148	< 1													
T35-149	< 1													
T35-150	1													
T35-151	< 1													
T35-152	< 1													

T35-145	1 III	29/8-1F-III-G	1015 hrs.	1 gallon sample
T35-146	2 III	29/8-2F-III-5C	0900-1400 hrs.	
T-35-147	3 III	29/8-3F-III-5C	" "	
T35-148	4 III	29/8-4F-III-5C	" "	
T35-149	6 III	29/8-6F-III-5C	" "	
T35-150	7 III	29/8-7F-III-5C	" "	
T35-151	8 III	29/8-8F-III-5C	" "	
T35-152	9 III	29/8-9F-III-G	1030 hrs.	

All analyses except pH reported in
mg/litre unless otherwise indicated

MINISTRY OF THE ENVIRONMENT
CHEMICAL L. ORATORIES
INDUSTRIAL WASTES ANALYSIS

Municipality:

Report to:

c.c.

Source: Polymer

Date Sampled: Aug. 29/72

by:

Lab. No.	Phenols in ppb
T35-153	4
T35-154	3
T35-155	20
T35-156	16
T35-157	4
T35-158	15
T35-159	8
T35-160	12

T35-153	1 IV	29/8-1F-IV-G	1015 hrs.
T35-154	2 IV	29/8-2F-IV-5C	0900-1400 hrs.
T35-155	3 IV	29/8-3F-IV-5C	" "
T35-156	4 IV	29/8-4F-IV-5C	" "
T35-157	6 IV	29/8-6F-IV-5c	" "
T35-158	7 IV	29/8-7F-IV-5C	" "
T35-159	8 IV	29/8-8F IV-5C	" "
T35-160	9 IV	29/8-9F-IV-C	1030 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL L. ORATORIES
INDUSTRIAL WASTES ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Report to: c.c.

Source: **Polymer**

Date Sampled: Aug. 29/72 by:

Lab. No.	T.O.N.
T35-161	1:1600
T35-162	1:10
T35-163	1:5
T35-164	1:1600

T35-161	4V	29/8-4F-V-G	0920 hrs.
T35-162	6V	29/8-6F-V-G	0935 hrs.
T35-163	7V	29/8-7F-V-G	0945 hrs.
T35-164	8V	29/8-8F-V-G	1000 hrs.

ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

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All analyses except pH reported in p.p.m. unless otherwise indicated

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Sarnia

Report to: R.A. Breeze, 555 Exmouth, Sarnia

c.c.

Source: Polymer Corp. Ltd.

Date Sampled: Aug. 8/72 by: R.A.B. & P.L.

mm

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	pH at Lab
		Total	Susp.	Diss.			
T32-50	3.5	160	10	150	< 30	13	7.7
T32-51	2.0	200	10	190	< 30	11	7.9
T32-52	44.	390	40	350	100	34	7.4
T32-53	170	140	10	130	200	267	7.3
T32-54	10.	370	5	365	660	16	3.6
T32-55	1.2	140	5	135	< 30	11	7.8
T32-56	3.0	460	10	450	< 30	23	7.5
T32-57	5.0	200	10	190	< 30	17	7.8
T32-58	140	130	20	110	490	200	8.0

T32-50	1 I	8/8-1E-I-G	1315 hrs.
T32-51	2 I	8/8-2E-I-5C	0900-1400 hrs.
T32-52	3I	8/8-3E-I-4C	1000-1400 hrs.
T32-53	4I	8/8-4E-I-5C	0900-1400 hrs.
T32-54	5I	8/8-5E-I-5C	0900-1400 hrs.
T32-55	6I	8/8-6E-I- G	1110 hrs.
T32-56	7I	8/8-7E-I-5C	0900-1400 hrs.
T32-57	8I	8/8-8E-I-5C	" "
T32-58	10I	8/8-10E-I-5C	" "

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MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

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All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia

Report to:

c.c.

Source: Polymer Corp. Ltd.

Date Sampled: Aug. 8/72 by: R.A.B. & P.L.

mm

Lab. No.	~~5-Day B.O.D.~~ Ether Extractables	Solids											
		Total	Susp.	Diss.									
T32-59	< 1												
T32-60	1												
T32-61	2												
T32-62	< 1												
T32-63	< 1												
T32-64	< 1												
T32-65	< 1												
T32-66	< 1												
T32-67	53												

T32-59	1 III	8/8-1E-III-G	1315 hrs.	one gallon sample
T32-60	2 III	8/8-2E-III-5C	0900-1400 hrs.	
T32-61	3III	8/8-3E-III-4C	1000-1400 hrs.	
T32-62	4 III	8/8-4E-III-5C	0900-1400 hrs.	
T32-63	r III	8/8-5E-III-5C	0900-1400 hrs.	
T32-64	6III	8/8-6E-III-G	1110 hrs.	
T32-65	7 III	8/8-7E-III-5C	0900-1400 hrs.	
T32-66	8 III	8/8-8E-III-5C	" "	
T32-67	10 III	8/8-10E-III-5C	" "	

MINISTRY OF THE ENVIRONMENT

CHEMICAL L ORATORIES

INDUSTRIAL WASTES ANALYSIS

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All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia

Report to:

c.c.

Source: Polymer Corp. Ltd.

Date Sampled: Aug. 8/72 by: R.A.B. & P.L.

mm

Lab. No.	T.O.N.
T32-77	1:160
T32-78	1:5
T32-79	1:250
T32-80	1:80
T32-81	1:1600
T32-82	1:8
T32-83	1:4
T32-84	1:8
T32-85	1:2x10^8

T32-77	1V	8/8-1E-V-G	1315 hrs.
T32-78	2V	8/8-2E-V-G	1000 hrs.
T32-79	3V	8/8-3E-V-G	1040 hrs.
T32-80	4V	8/8-4E-V-G	0945 hrs.
T32-81	5V	8/8-5E-V-G	0935 hrs.
T32-82	6V	8/8-6E-V-G	1110 hrs.
T32-83	7V	8/8-7E-V-G	0915 hrs.
T32-84	8V	8/8-8E-V-G	0930 hrs.
T32-85	10V	8/8-10E-V-G	1015 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia
Report to: R. Breeze, Sarnia
c.c.
Source: Polymer Corp. Ltd.
Date Sampled: Aug. 9/72 by: RB/PL

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	Nitrogen as N		Total Phosphorus as P	pH at Lab.			
		Total	Susp.	Diss.			Free Ammonia	Total Kjeldahl					
T32-115	1.2	140	5	135	< 30	8	.20	.85	.050	7.9			
T32-116	1.0	200	5	195	< 30	6	.20	.70	.050	7.9			
T32-117	34.	310	10	300	35	8	.20	1.2	.065	7.2			
T32-118	120	270	5	265	250	32	.20	.60	.080	7.3			

T32-115	1 I	9/8	1E - I - G	1315 hrs.
T32-116	2 I	9/8	2E - I - 5C	0900 - 1400 hrs.
T32-117	3 I	9/8	3E - I - 4C	0900 - 1400 hrs.
T32-118	4 I	9/8	4E - I - 5C	0900 [illegible] 1400 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: **Sarnia** Report to: **R. Breeze, Sarnia** c.c.

Source: **Polymer Corp. Ltd.**

Date Sampled: **Aug. 9/72** by: **RB/PL**

Lab. No.	5-Day B.O.D.	Solids			pH at Lab.	C.O.D.	T.O.C.	Free Ammonia as N	Total Kjeldahl as N	Total Phosphorus as P		
		Total	Susp.	Diss.								
T32-119	4.0	340	5	335	6.1	325	74	.60	1.0	.12		
T32-120	3.0	380	10	370	7.8	40	7	.80	3.0	.23		
T32-121	0.4	170	10	160	8.1	< 30	5	.20	.75	.055		
T32-122	55.	180	40	140	8.6	275	70	3.0	7.5	.14		

T32-119	5 I	5E - I - 5C	0900 - 1400 hrs.
T32-120	7 I	7E - I - 5C	0900 - 1400 hrs.
T32-121	8 I	8E - I - 5C	0900 - 1400 hrs.
T32-122	10 I	10E - I - 5C	0900 - 1400 hrs.

All analyses except pH reported in mg/litre unless otherwise indicated

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

Municipality: Report to: c.c.

Source:

Date Sampled: **Aug. 9/72** by:

Lab. No.	5-Day B.O.D.	Solids			Ether Solubles								
		Total	Susp.	Diss.									
T32-123					< 1								
T32-124					< 1								
T32-125					3								
T32-126					1								
T32-127					1								
T32-128					< 1								
T32-129					< 1								
T32-130					38								

T32-123	1 III	9/8	1E - III - G	1315 hrs.
T32-124	2 III	9/8	2E - III - 5C	0900 - 1400 hrs.
T32-125	3 III	9/8	3E - III - 4C	1000 - 1400 hrs.
T32-126	4 III	9/8	4E - III - 5C	0900 - 1400 hrs.
T32-127	5 III	9/8	5E - III - 5C	0900 - 1400 hrs.
T32-128	7 III	9/8	7E - III - 5C	0900 - 1400 hrs.
T32-129	8 III	9/8	8E - III - 5C	0900 - 1400 hrs.
T32-130	10 III	9/8	10E - III - 5C	0900 - 1400 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality:

Report to:

c.c.

Source:

Date Sampled: Aug. 9/72 by:

Lab. No.	5-Day B.O.D.	Solids			Phenols in ppb.								
		Total	Susp.	Diss.									
T32-131					4								
T32-132					8								
T32-133					60								
T32-134					200								
T32-135					4								
T32-136					50								
T32-137					10								
T32-138					375								

T32-131	1 IV	9/8	1E - IV - G	1315 hrs.
T32-132	2 IV	9/8	2E - IV - 5C	0900 - 1400 hrs.
T32-133	3 IV	9/8	3E - IV - 4C	1000 - 1400 hrs.
T32-134	4 IV	9/8	4E - IV - 5C	0900 - 1400 hrs.
T32-135	5 IV	9/8	5E - IV - 5C	0900 - 1400 hrs.
T32-136	7 IV	9/8	7E - IV - 5C	0900 - 1400 hrs.
T32-137	8 IV	9/8	8E - IV - 5C	0900 - 1400 hrs.
T32-138	10 IV	9/8	10E - IV - 5C	0900 - 1400 hrs.

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All analyses except pH reported in mg/litre unless otherwise indicated

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

Municipality:

Report to:

c.c.

Source:

Date Sampled: by:

Lab. No.	5-Day B.O.D.	Solids			TON								
		Total	Susp.	Diss.									
T32-139					1:20								
T32-140					1:40								
T32-141					1:2000								
T32-142					1:80								
T32-143					1:60								
T32-144					1:60								
T32-145					1:60								
T32-146					1:133000								

T32-139	1 V	9/8	1E - V - G	1315 hrs.
T32-140	2 V	9/8	2E - V - G	1030 hrs.
T32-141	3 V	9/8	3E - V - G	1030 hrs.
T32-142	4 V	9/8	4E - V - G	1005 hrs.
T32-143	5 V	9/8	5E - V - G	1000 hrs.
T32-144	7 V	9/8	7E - V - G	0935 hrs.
T32-145	8 V	9/8	8E - V - G	0945 hrs.
T32-146	10 V	9/8	10E - V - G	1040 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

Page 1 of 4

INDUSTRIAL WASTE ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality: Sarnia

Report to: R. A. Breeze

c.c.

Source: Polymer Corp. Ltd.

Date Sampled: Aug. 10/72 by: R.A.B. & P.L.

mm

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	pH at Lab	NITROGEN AS N Free Ammonia	NITROGEN AS N Total Kjeldahl	Total Phosphorus as P			
		Total	Susp.	Diss.									
T33-1	1.2	160	5	155	< 30	3	8.2	.20	.5	.1			
T33-2	3.0	190	10	180	< 30	3	8.0	.10	.5	.1			
T33-3	9.0	310	20	290	< 30	6	7.4	.40	1.0	.15			
T33-4	90.	120	5	115	210	31	7.2	<.1	.5	.20			
T33-5	30.	330	70	260	420	113	10.5	.20	1.0	.4			
T33-6	8.0	310	20	290	50	12	7.5	2.2	6.0	.15			
T33-7	3.0	180	10	170	< 30	2	7.9	.20	1.0	.1			
T33-8	85.	*	*	*	2350	*	10.	3.8	55.	.35			
T33-9	48.	160	30	130	260	60	8.6	2.2	3.5	.10			

* This sample is not suitable for total or susp. determination, T.O.C. measurement

T33-1	1I	10/8-1E-I-G	1415 hrs.
T33-2	2I	10/8-2E-I-5C	0900-1400 hrs.
T33-3	3I	10/8-3E-I-5C	" "
T33-4	4I	10/8-4E-I-5C	" "
T33-5	5I	10/8-5E-I-5C	" "
T33-6	7I	10/8-7E-I-5C	" "
T33-7	8I	10/8-8E-I-5C	" "
T33-8	9I	10/8-9E-I-G	1445 hrs.
T33-9	10I	10/8-10E-I-5C	0900-1400 hrs.

12-042

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

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All analyses except pH reported in mg/litre unless otherwise indicated

Municipality:

Report to:

c.c.

Source: **Polymer Corporation Ltd.**

Date Sampled: Aug. 10/72 by:

Lab. No.	5-Day B.O.D. **Ether Solubles**	Solids												
		Total	Susp.	Diss.										
T33-10	< 1													
T33-11	0													
T33-12	2													
T33-13	Trace													
T33-14	4													
T33-15	3													
T33-16	Trace													
T33-17	0													
T33-18	35													

T33-10	1 III	10/8-1E-III-G	1415 hrs.
T33-11	2III	10/8-2E-III-5C	0900-1400 hrs.
T33-12	3 III	10/8-3E-III-5C	" "
T33-13	4 III	10/7-4E-III-5C	" "
T33-14	5 III	10/8-5E-III-5C	" "
T33-15	7 III	10/8-7E-III-5C	" "
T33-16	8 III	10/8-8E-III-5C	" "
T33-17	9 III	10/8-9E-III-G	1445 hrs.

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES
INDUSTRIAL WASTES ANALYSIS

All analyses except pH reported in mg/litre unless otherwise indicated

Municipality:
Report to:
c.c.
Source: Polymer Corp. Ltd.
Date Sampled: Aug. 10/72 by:

Lab. No.	Phenols in ppb*
T33-19	4
T33-20	20
T33-21	55
T33-22	55
T33-23	12
T33-24	140
T33-25	15
T33-26	400
T33-27	300

* Test performed on preserved sample

T33-19	1 IV	10/8-1E-IV-G	1415 hrs.
T33-20	2 IV	10/8-2E-IV-5C	0900-1400 hrs.
T33-21	3 IV	10/8-3E-IV-5C	" "
T33-22	4 IV	10/8-4E -IV-5C	" "
T33-23	5 IV	10/8-5E-IV-5C	" "
T33-24	7 IV	10/8-7E-IV-5C	" "
T33-25	8 IV	10/8-8E-IV-5C	" "
T33-26	9 IV	10/8-9E-IV-G	1445 hrs.
T33-27	10 IV	10/8-10E-IV-5C	0900-1400 hrs.

MINISTRY OF THE ENVIRONMENT

CHEMICAL LABORATORIES

INDUSTRIAL WASTES ANALYSIS

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All analyses except pH reported in mg/litre unless otherwise indicated

Municipality:

Report to:

c.c.

Source: Polymer Corp. Ltd.

Date Sampled: Aug. 10/72

by:

mm

Lab. No.	T.O.N.
T33-28	1:2
T33-29	1:60
T33-30	1:2000
T33-31	1:200
T33-32	1:200
T33-33	1:250
T33-34	1:20
T33-35	1:2500

T33-28	1V	10/8-1E-V-G	1415 hrs.
T33-29	2V	10/8-2E-V-G	1015 hrs.
T33-30	3V	10/8-3E-V-G	1005 hrs.
T33-31	4V	10/8-4E-V-G	1000 hrs.
T33-32	5V	10/8-5E-V-G	0955 hrs.
T33-33	7V	10/8-7E-V-G	0930 hrs.
T33-34	8V	10/8-8E-V-G	0945 hrs.
T33-35	10V	10/8-10E-V-G	1025 hrs.

12-061

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All analyses except pH reported in mg/litre unless otherwise indicated

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

Municipality: Sarnia   Report to: R. Breeze, Sarnia   c.c.

Source: Polymer Corp. Ltd.

Date Sampled: Sept. 14/72 by: RB

Lab. No.	5-Day B.O.D.	Solids			C.O.D.	T.O.C.	Copper as Cu	Free Ammonia as N	pH at Lab.				
		Total	Susp.	Diss.									
T38-10	20.	3300	50	3250	170	56	0.44	3.6	6.8				
T38-11	420	4460	100	4360	960	974	5.5	140.	7.5				
T38-12	1300	5440	60	5380	3050	1256	54	370.	8.9				
T38-13	200	6700	230	6470	800	700 *	-	-	7.3				

** Analysis not completed because test not logged in properly on appropriate work sheet.

* Total carbon

T38-10	2I.	2G - I - G	1000 hrs.
T38-11	4I.	4G - I - G	"
T38-12	5I.	5G - I - G	"
T38-13	6I.	6G - I - G	"

12-042

All analyses except pH reported in mg/litre unless otherwise indicated

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

Municipality: Report to: c.c.

Source:

Date Sampled: Sept. 14/72 by: RB

Lab. No.	5-Day B.O.D.	Solids			Ether Extractables								
		Total	Susp.	Diss.									
T38-14					7								
T38-15					18								
T38-16					52								
T38-17					17								

T38-14	2 III	2G - III - G	1000 hrs.
T38-15	4 III	4G - III - G	"
T38-16	5 III	5G - III - G	"
T38-17	6 III	6G - III - G	"

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All analyses except pH reported in
mg/litre unless otherwise indicated

MINISTRY OF THE ENVIRONMENT
CHEMICAL LABORATORIES

INDUSTRIAL WASTE ANALYSIS

Municipality: Report to: c.c.

Source:

Date Sampled: Sept. 14/72 by: RB

Lab. No.	5-Day B.O.D.	Solids			Phenols in ppb. **								
		Total	Susp.	Diss.									
T38-18					11*								
T38-19					165*								
T38-20					635*								
T38-21					110*								

* 4 amino antipyrine method

** Test performed on preserved sample

T38-18	2IV.	2G - IV - G	1000 hrs.	Preserved with $CuSO_4$
T38-19	4IV.	4G - IV - G	"	"
T38-20	5IV.	5G - IV - G	"	"
T38-21	6IV.	6G - IV - G	"	"

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